

CASTLE & COOKE FOODS

DIVISION OF CASTLE & COOKE, INC. POST OFFICE BOX 3928 • SAN FRANCISCO, CA 94119.

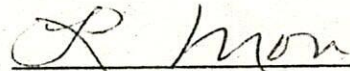
CONFIDENTIAL

OFFICE CORRESPONDENCE

DATE: September 22, 1980
TO: Distribution
FROM: R. Mori
SUBJECT: Castle & Cooke Frozen Shellfish and
Salmon Specifications

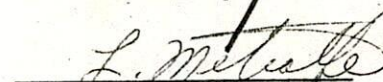
The attached 1980 Frozen Shellfish and Salmon Specifications are approved as indicated by "APPROVED" stamped on each page in place of signatures on individual pages. These specifications shall supersede all other prior specifications. Future changes shall require approval signatures on specification sheets.

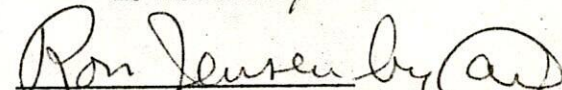
Recommended by:


R. Mori

Approved by:


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RM/fj
Attach.

Distribution:

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Superintendent, M/V Skookum Chief
Manager, Sales & Marketing
Corporate Director, QA, C&CF
Secretary, QA, Salmon & Shellfish
(Original)

Name SalmonPAGE 1 OF 127Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

I. FUNCTIONS OF QUALITY CONTROL

A. Functions. The functions of quality control is to keep management of the processing facility aware of the conditions existing in the operation. Through the use of proper quality control technique, product objective can be achieved, particularly in the area of government regulations, product quality, as well as economic significance related to production. A good quality control program can detect deviations from the desired production parameter as set forth. Under the present food law, management is responsible for conformance and may be fined or imprisoned for acts in his processing plant even though unaware of the action. The findings of quality control must be rapidly passed to the operation personnel whenever a problem arises. A good communication is a must. Formal program should be developed to assure that all appropriate information on production deviation reach the individual responsible for the corrective action. In many segments of the food processing industry quality control records and processing records are required by governmental regulations. For this reason it is vital that such mandatory records be properly maintained and reviewed by responsible plant management.

B. The Food & Drug Administration, in part of the CFR 113 thermal process of low acid food, require the canner to keep certain

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/7 King Crab, Snow Crab,
Dungeness Crab &
Name Frozen Salmon

Date March, 1980

Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 2 OF 16

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

records. The canner must keep processing and production records which include the name of the product, the container code, the retort or processing system number, the size of container, the approximate number of containers per cook interval, the minimum initial temperature, actual processing time and temperature, the mercury-in-glass and recording thermometer reading, the time the steam is on, the time the temperature is up to the processing temperature, the time steam is off, the venting time, and/or the temperature to which the retort is vented. Canner must keep records of the visual inspections of the cans and all the container closure examinations, as well as the reformer inspection records. Written record of all container closure examination shall specify the product codes, the date, the time of closure inspection, the measurement obtained and all corrective action taken, if deviation from normal requirement. Written records must be signed or initialed by both the individual recording the information and by appropriate supervisory personnel. Signing must include the date the inspection was accomplished. The record of inspection shall consist of the maintenance record of the reformer as well as the maintenance record of the seamer. Also, as far as the retort monitor is concerned, anytime retort modification is done a record must be maintained specifying type of modification done

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS MANUFACTURING SPECIFICATION PAGE 3 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

to the retort. It would be best if any outside maintenance is done to the retort and/or seamer and reformer, the record of the maintenance by the individual doing that work shall be so recorded.

- C. Warehouse Inspection. Warehouse inspection should be an integral part of a quality control program. It is recommended, therefore, that a procedure to audit the condition of cans and cases or pallets be part of the quality control function. Defects should be counted and recorded. Identification of these defects will aid in finding ways to prevent them from reoccurring. Suggested classifications are seam dents, body dents, sharp rim dents, leaker, wet cans, rusty cans, dirty cans, water spotting, mislabeling, and poor labeling, and also problem with wet cases and loose flaps.

II. INGREDIENT STORAGE

- A. The Food & Drug Administration as well as the State require that any items going into canning and/or freezing should be treated as a food ingredient. This will be the salt and/or any chemical used in the Roe operation must be handled in a sanitary manner. It must be protected from contamination which includes people walking, sitting on the bag, and all animal contamination such as birds, cats and dogs. The ingredients should be stored in a rodent proof room. Whatever room is used for the storage of the ingredients must not have any openings greater than 1/4". The storage area

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS**

MANUFACTURING SPECIFICATION

PAGE 4 OF 116

Name Frozen SalmonDate March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

must be kept clean and dry. It must be stored on a pallet off the floor and an inspection path must exist between the ingredient and the wall. It would be best to have a two foot (2') white striped line along the side of the wall for inspection.

- B. Any ingredients that are broken during shipment must be stored separately and used for non-food contact purpose and it must be so marked. The ingredient storage area must be checked daily and any problem noted must be corrected immediately. Storage of fiber on the outside shall be prohibited. Fiber is considered to be part of the food-contact surface.

III.**WATER QUALITY.**

- A. The State of Alaska, Department of Agriculture, regulations require that all water used for food processing come from approved source. A sample of all water supply used for processing must be submitted for bacteriological analysis at least monthly during the season. If this is not possible, sample may be sent to the nearest approved laboratory. Pan-Alaska Fisheries location has such facilities and if at all possible send to the State, but if not possible, the use of Pan-Alaska's laboratory analysis will suffice. The sample should be taken at a time so that no more than 24 hours will elapse before it is received for examination.

MULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 5 OF 116Name Frozen SalmonDate March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- B. Any water sample to the State or to a private laboratory, a certificate of inspection or analysis must be given back to the originator and records kept which includes time and date that the sample is taken and the analysis performed.

IV. SNOW CRAB SECTION PRODUCTIONA. Receiving.

1. Vessel should be inspected upon arrival for, (1) dead loss - greater than 10% is cause to closely examine entire catch for other problems; (2) diesel contamination - any evidence of diesel should result in rejection; and (3) overall catch condition - live, vigorous crab, of proper size and no evidence of contamination or mishandling to affect overall quality is desired.
2. Vessel should pump down tanks immediately before unloading commences. Brailers, buckets, or other apparatus can be used to move crab to hopper, live tank, or other holding apparatus. Dead crab are to be rejected, as are small crab, crab other than the genus Chionocetes and species Bairdi and females of any species. Species Opilio may be accepted if agreed upon by buyer. Unloading containers should be cleaned daily.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab
Dungeness Crab &CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATIONName Frozen Salmon
Date March, 1980
Issue DraftPAGE 6 OF 116

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

Rejected live crab should be thrown overboard to prevent dying, and dead crab should be deck-loaded and removed after vessel has put out to sea.

3. When off-loading, unloaders should count specified number of crab into brailer or other container. This should then be accurately weighed (a) to insure proper payment to vessel owner and (b) to obtain an accurate size average on the catch. Scales are to be checked regularly using standard weights. Scale types should be accurate $\pm .5\%$ of weight.

4. Catch Holding

- a. Live tanks - should be filled with circulating sea-water of the proper temperature and salinity to keep crab alive and vigorous, (2 to 10°C, pH 6.8 to 7.2, salinity of 34 salometer degrees). There should be no possibility of contamination from sewage, bilge or other sources. Water must meet all Alaska Department of Environmental Conservation standards. (TP NO. 5).
- b. Brailers - should be hung in sea-water if not to be used within 1 to 1.5 hours. Should be away from effluent outfalls and other sources of contamination.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab
 Dungeness Crab &
 Name Frozen Salmon

Date March, 1980

Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
 MANUFACTURING SPECIFICATION

PAGE 7 OF 116

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

- c. Hoppers - should be filled when shift begins, and emptied at meal time to prevent crab dying. When using buckets or brailers, load as gently as possible to minimize breakage.

B. Butchering

1. At this point, and throughout the rest of the processing flow, GMP's and FDA regulations are rigidly enforced (e.g., hair-nets, hand-dips, etc.). Contamination is to be avoided in all previous steps also.
2. Only live crab should be butchered - any with sour or musty odors in the butchered sections should be discarded.
3. Equipment used for butchering.
 - a. Metal bar or spike with vertical butchering blade.
 - b. Heavy-duty apron for butchers.
4. Procedure for butchering.
 - a. Grasp left-side and right-side legs firmly in either hand.
 - b. Force belly portion of crab onto blade.
 - c. Pull up and out to separate crab into two halves, or clusters. Most of the viscera and entire carapace will fall free into gut chute or belt.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab, &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 8 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight /case: _____
Gross Weight /case: _____
Container Code: _____

PROCESS PROCEDURE

- d. Give slight shake to remove any remaining viscera, and also to facilitate bleeding.
5. Gilling - at this point, gills are removed from body meat by brushes, roller, or dull knives. All gill must be removed. Mouth parts or other extraneous material is also removed at this point.
6. Washing is then done via a shower-belt arrangement or soaking bins. Water must be of sanitary quality and should be chlorinated to a .5 to 3.0 ppm residual. This removes any residual gut or blood.
- C. Packing - for Batch Cookers
 1. Crab are packed in baskets with shoulders facing out and legs straightened to facilitate cooking. (After freezing, the legs will lock together via ice formation, and this will minimize breakage in transit).
 2. Crab should be packed tightly but care should be taken to minimize breakage at this point. Over-packing of baskets can also result in the interior portion being inadequately cooked. (Optimum weight is 180 to 200 pounds - 90 to 100 pound cases).
 3. Baskets should be in good repair with no loose metal as a potential contaminant. They should be cleaned with

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 9 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight case: _____
Gross Weight case: _____
Container Code: _____

PROCESS PROCEDURE

a boilout cleaner or an adequate substitute on a regular basis.

4. Prior to cooking, the baskets may be immersed in a fresh or sea-water soak tank.

The soak tank should circulate water or else be changed on a regular basis to eliminate bacterial build-up. The dimensions of the tank should be sufficient to completely immerse a basket inside it.

See also: Coding.

D. Cooking

1. Batch Cooking.

- a. The cooker should be from 210° to 212°F. If, at anytime the cooker temperature drops below 208°F, additional time must be added to cook time for any period the temperature is below 208°F.
- b. Cook time for tanner species range from 16 to 18 minutes, depending upon size. For crab averaging under 1.8 pounds, a 16 minute cook is generally adequate. For crab 1.8 to 2.1 pounds, a 17 minute cook is usually adequate. For all crab over 2.1 pounds, 18 minutes is usually adequate.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab

Dungeness Crab &

Name Frozen Salmon

Date March, 1980

Issue Draft

SUPERSEDES

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 10 OF 116Container type:
Size Container:
Weight Container:
Units/case:
Net Weight case:
Gross Weight case:
Container Code:**PROCESS PROCEDURE**

A good indicator of proper cook time is the product core temperature. Immediately after removal from the cooker, the shoulder portion of the largest clusters should be probed using a metal-stem thermometer or other non-glass temperature measuring device. At least three measurements should be made per basket. As long as no core temperatures taken from the largest clusters in the middle of the shoulder meat fall below 190°F, the cook time may be considered adequate.

The cooker must be monitored at least every 15 minutes for proper temperature, as should the product.

2. Continuous Cookers.

- a. Cook temperature and time is identical to that of batch cooker. Time is measured and adjusted by timing a chain and, in turn, timing the product. Due to the nature of the process, there is no packing step. Core temperatures and cooker temperatures must also be monitored on a regular basis, at least every 15 minutes.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 11 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

E. Cooling and Chilling

1. Immediately after the cook, product must be immersed in cool water. This may be sea-water or fresh water, should be sanitary and chlorinated to a 0.5 to 3.0 ppm residual. This "quenches" the cook and also lowers product temperature for further handling and the water temperature should be below 50°F.

Cooling may take place in either a flume or a tank. In either case, the circulating water must completely cover the product.

2. From the cooling tanks, if product temperature is still above 40°F, a chill tank is used to facilitate freezing. The chiller should be circulating sea or fresh water chlorinated to a 0.5 to 3.0 ppm residual. The temperature should be 34°F, but should not cause icing on the refrigeration coils. Product should be held in the chiller until a temperature below 40°F is reached. Water and product temperature should be monitored at least every 15 minutes by Quality Control personnel.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab

Dungeness Crab &

Name Frozen SalmonDate March, 1980Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 12 OF 116

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

F. Brine Freezing

1. Product temperature.

a. Must be below 40°F to avoid.

(1) Excess salt uptake.

(2) Water loss and dilution of brine.

(3) Warming of brine freezing solution.

2. Brine temperature.

a. Must be below +5°F to avoid:

(1) Excess salt uptake.

b. Must be above -6°F to avoid freezing of solution.

(The eutectic point of NaCl brine is -6°F, and should read 88.3 salometer degrees at 60°F, using a standard salometer). (TP NO. 4).

3. Materials.

a. Water must be sanitary quality.

b. Salt (NaCl) must be food-grade. Stored salt must be handled in a sanitary manner. Salt (NaCl) is considered a food ingredient when used in a brine freezing system.

4. Brine.

a. Brine should be made in concentrations as close to saturated as possible. When changing tanks, care should be taken to keep concentration at maximum without exceeding

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &

Name Frozen Salmon

Date April, 1980

Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 13 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

88 salometer degrees on the salometer. When adding warm brine, concentrations are frequently so high that it must be diluted to 87 to 88 salometer degrees salinity using sanitary water prior to use.

- b. When adding brine while the system is in use, tank temperatures must be monitored closely to prevent excessive warming of the brine. Brine must always be added slowly to an operating brine freezer.
5. Brine must be below +2°F before product is immersed. Salinity should be above 84 salometer degrees on the salometer (90 salometer degrees salinity at 0°F), but at this point must be watched closely, as greater concentrations of NaCl will actually elevate the freezing point of brine which can cause "salting up" of product. Coils are usually 5°F to 10°F colder than the circulating brine, so temperatures or salinity which may not cause ice formation in the tank may cause icing of the coils, which insulates them and greatly impedes the efficiency of heat transfer that is vital for proper functioning of the brine system.
6. Freezing is considered complete when the product is completely solid when the exposed shoulder meat is probed with a sharp instrument such as an ice pick. Internal temperatures of the product should be $\leq$ +10°F.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12.77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 14 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

G. GLAZING OF BRINE-FROZEN PRODUCT

1. The baskets are allowed to drain 10 to 15 seconds after removal from the brine.
2. The baskets are completely immersed in FRESH water chlorinated to a 0.5 to 3.0 ppm residual, immediately removed and dipped again. There is no "soak time". This procedure constitutes a "double-dip" fresh water glaze, which all in-shell products must have. Glaze percentage varies between 5% and 12%. This is difficult to control due to the nature of processing. Glaze water must be kept circulating and new water added constantly to avoid "salting up". Salt in the glaze water will result in an inferior glaze, and a potentially inferior product.

H. CASE-UP OF BRINE-FROZEN PRODUCT

1. Drop-doors are released from the baskets and each of the two 80 to 100 pound portions of the basket are covered with a poly liner. (See "Material Specifications").
2. Poly-wrapped "block" of sections is "flipped" into wet-lock boxes (see "Material Specifications"), banded or stapled, weighed accurately, and coded.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 15 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

3. Baskets must be rinsed in chlorinated (0.5 to 3.0 ppm) water before being re-used. All remaining crab pieces must also be removed. If to be stored before re-using, they must be cleaned prior to storage, and rinsed with a 50 ppm chlorine-water solution immediately before re-use. Baskets should be cleaned on a regular basis using cooker boil-out chemicals at the prescribed temperature for 5 to 10 minutes to remove protein build-up and other deposits that are not removed with normal rinsing.

I. CODING

1. Time Coding.

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
AK Cert #	Plant	Month	Day	Year	Period

a. All Alaskan operations have certification number
AK 155.

b. Plant ID:

- A. M/V Royal Alaskan
- B. Barge Magellan
- C. Unalaska Shore Facility
- D. M/V Royal Sea.
- E. M/V Skookum Chief
- F. M/V Royal Venture
- G. American No. 1

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 16 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

c. Month - January = 1; February = 2; March = 3; etc.,
 October = 0; November = N; December = D.

d. Day of the Month.

e. Year.

f. Period.

A - 1st 6 hours of day shift.

B - 2nd 6 hours of day shift.

C - 1st 6 hours of night shift.

D - 2nd 6 hours of night shift.

2. Quality Coding.

Blast Grades

TFL

TEL

TSL

Brine Grades

TFR

TER

TSR

a. Last letter denotes how frozen: L = Blast; R = Brine.

b. First letter denotes product type: T = Tanner Crab.

c. Middle letter denotes quality.

F = FOLDED. All clusters intact and folded. (Folded, in the case of brine, means legs straightened, but legs folded over each other). Clusters may be missing trailing legs and be considered complete. Barnacles,

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
 Dungeness Crab &
 Frozen Salmon
 Name _____
 Date March, 1980
 Issue Draft
 SUPERSEDES _____

CASTLE & COOKE FOODS
 MANUFACTURING SPECIFICATION
 PAGE 17 OF 116

Container type: _____
 Size Container: _____
 Weight Container: _____
 Units/case: _____
 Net Weight/case: _____
 Gross Weight case: _____
 Container Code: _____

PROCESS PROCEDURE

marine growth, and discoloration should not exceed 15% of total shell surface. (Must be full meat (50%) meat).

S = FOR SPLIT LEG. Not exclusively for split leg, but to include all sections with full meat that are clean (see above), but broken.

E = FOR EXTRACTION. All product with heavy marine growth, partially filled meat, or other quality-lowering characteristics that would preclude its sale as an in-shell item.

- d. Quality grading on blast and brine frozen product must be done at packing stage and baskets (or boxes, in the case of blast product) marked for proper handling in case-up.
- e. Cases are accurately weighed and marked before removed to cold storage. Scales are checked regularly by Quality Control personnel, using standard weights. (This should be done on a shift-by-shift basis, or whenever use dictates).

J. BLAST FREEZING

1. Product must be removed from cooking baskets, flumes, or belts, and placed into wet-lock cardboard box bottoms or

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 18 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

metal pans. Weights may be 13, 20, or 25 pounds NET, or whatever is specified by the buyer and/or Marketing. A minimum of 5% of all boxes produced should be check-weighed by Quality Control personnel. An 8 ounce water-allowance is needed at the time of packing to make up for water loss due to drip loss before freezing and dehydration in the blast freezer. (This is the allowance commonly used for 25 pound cases, and should be adjusted as necessary).

2. Product should be packed in the following ways:
 - a. Rubber-banded clusters should be packed so that after glazing they will be right-side-up (dorsal side up). Boxes should be packed neatly and as compactly as possible to minimize breakage of clusters in transit.
 - b. Loose clusters should be packed claws up so that after glazing all clusters will freeze together in a block to minimize breakage in transit.
 - c. If grading is to be done, it must be done in the packing state (see "Coding").
3. Product should be frozen as soon as possible after packing to prevent weight loss due to drip and bacterial build-up. If it is not frozen within 60 minutes of packing time,

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

C&C-596
12-77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 19 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight case:
Gross Weight case:
Container Code:

PROCESS PROCEDURE

it should be kept in a holding room at less than 45°F for a maximum of six (6) hours.

4. Blast freezer temperatures should be $\leq -20^{\circ}\text{F}$. At these temperatures, freezing is fairly rapid. Freezing times vary due to differences in freezer design, amount of product frozen and temperature of in-going product. Product entering blast freezers should be less than 45°F to facilitate freezing.
5. Operation of blast freezers should be as follows:
 - a. Freezer floor should be cleaned of all ice and water after removal of racks and defrosting of coils.
 - b. All racks should be loaded into freezer, leaving maximum airspace possible between racks.
 - c. Door should be sealed and freezer turned on. DOOR SHOULD NOT BE REOPENED UNTIL FREEZING IS COMPLETED.
 - D. Temperature should be monitored regularly as well as time in.
 - e. Freezer should be turned off and racks removed one at a time to the glazing operation.
6. Product should be removed as soon as possible after freezing of product is considered complete (core temperature below $+5^{\circ}\text{F}$). Extended freezing time can cause dehydration of product and subsequent loss of both quality (due to "freezer burn") and recovery weight.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

C&C-590
12/77 King Crab, Snow Crab
Dungeness Crab
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 20 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight case: _____
Gross Weight case: _____
Container Code: _____

PROCESS PROCEDURE

K. GLAZING OF BLAST-FROZEN PRODUCT

1. After removal from blast freezers, product should immediately be run through the fresh-water spray tunnels to glaze it. Glaze generally varies between 4% and 9%. Glaze water should be chlorinated to a 0.5 to 3.0 ppm residual.
2. After glazing, containers should be allowed to drain on a 10° to 30° incline for at least 30 seconds.

L. CASE-UP OF BLAST FROZEN PRODUCT

1. After draining, product in metal pans should be removed and "flipped" into wet-lock box bottoms; the final product should be right-side up. The metal pans must be washed and sanitized using a 50 ppm chlorine solution (or accepted substitute) before re-use.
2. Tops are put onto box bottoms, and codes are stamped. Codes are identical to those used for brine-frozen product, except for quality coding (see "Coding"). Tops are strapped or stapled.

M. COLD STORAGE

1. After casing-up, product should be removed immediately to cold storage. Under no circumstances should product be left out longer than 60 minutes. Partial pallets should

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICE:

CASTLE & COOKE FOODS MANUFACTURING SPECIFICATION

PAGE 21 OF 116

Name

Date

Issue

March, 1980Draft

SUPERSEDES _____

Container type:

Size Container:

Weight Container:

Units/case:

Net Weight/case:

Gross Weight/case:

Container Code:

PROCESS PROCEDURE

be removed to cold storage during meal times and between shifts.

2. Cold storage temperatures should be below +5°F. Below -5°F is desirable. Temperatures should be monitored by Quality Control personnel at least twice per shift.
3. Product in cold storage should be separated from non-food items, such as bait. Product should be separated by production date as much as possible, and by product type.
4. Product should be arranged in cold storage "First-In; First-Out" to prevent delays in shipping of first-run product.
5. Any broken or disfigured cases in cold storage should be removed and recased. All codes and leading marks must be transferred to the new case.

N. SHIPPING

1. When vans are used, vans should be initially checked for cleanliness, then product should be loaded as quickly as possible. The van should be sealed, and the temperature monitored every three hours. Temperatures should be below +5°F, except during defrost cycles.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12-77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 22 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

2. When freighters are used, product should be loaded as quickly as possible. Heavy rain or snow will coat boxes with ice and can lower strength of carton, so loading under these conditions should be discouraged.
3. Accurate records and bills of lading are of utmost importance. Notify receiving operations as soon as shipments are made.

0. MONITORING OF THE PROCESSING FLOW

1. The following points are to be monitored by Quality Control and Production personnel.
 - a. Overall quality of incoming crab. Inspect for contaminants, defects, etc. Log results hourly or as needed.
 - b. Sanitary condition of entire plant, including all processing areas and machinery, storage areas, and cold storage. Includes general condition of plant exterior and grounds, and problems therein, such as chipping paint, or rodent/insect infestation. This should be done once per shift. Preventative programs of rodent control, insect control, etc., are undertaken by the Quality Control Department.
 - c. Sanitary practices of all employees. Generally referred to as GMP's, this includes all situations or practices

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES
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C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 23 OF 116

Name _____

Date March, 1980

Issue 11 Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight /case: _____
Gross Weight /case: _____
Container Code: _____

PROCESS PROCEDURE

that could be considered potentially hazardous or could possibly result in product contamination or lowering of product quality.

- d. Cooker temperatures should be monitored every 15 minutes. (TP NO. 1).
- e. Cooked product temperature should be monitored every 15 minutes. (TP NO. 1).
- f. Chiller temperature should be monitored every 15 minutes. (TP NO. 1).
- g. Chilled product temperature should be monitored on every basket before immersing it in brine. (TP NO. 1).
- h. Brine temperature and salinity should be monitored every 15 minutes. (TP NO. 1).
- i. Every basket emerging from the brine should be checked to insure it is frozen properly. (TP NO. 1).
- j. After glazing, two or three samples should be taken per shift to determine the percent glaze on the product. (TP NO. 2).
- k. Salt determinations should be performed at least twice daily, and also whenever processing procedures indicate that excess salt uptake may have occurred. (TP NO. 7).

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 24 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

When questionable product is to be sampled, a minimum of three sections should be sampled per basket.

Organoleptic analysis may also be used providing that experience has shown this to be a valid testing procedure, and results of organoleptic analysis agree with chemical analysis for salt content.

1. Blueing samples should be taken hourly to insure adequate cook time. (TP NO. 3). These samples should be returned to processing line if negative. Additional samples should be taken whenever processing procedures indicate undercooking may have occurred. When this happens, a minimum of three samples per basket should be taken.
- m. Codes should be checked on a period basis to make sure they are correct.
- n. All scales should be checked twice per shift to insure accuracy. These include buying scales and case-up scales (brine and blast line).
- o. Blast freezer temperatures should be monitored every 30 minutes.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 25 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- p. Product from blast freezers should be checked to insure proper freezing. (TP NO. 1).
- q. The cold storage area temperature should be monitored twice daily.
- r. Product being loaded into vans and/or freighters should be checked to insure proper temperatures. (TP NO. 1).
- s. Bacteriological samples should be taken daily. One sample per line is sufficient, unless contamination is suspected. Processing water should be examined daily for coliforms. (TP NO. 5).
- t. On a boat-by-boat basis, samples should be taken after the cook, and hand extracted to determine the total percent meat in an average section for this load.

NOTE: The terms "section" and "cluster" will be used interchangeably to denote the end product of butchering crab for shell product.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C--596
12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 26 OF 127

Name _____
Date April, 1981
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

V. KING CRAB SECTION PRODUCTION

A. RECEIVING

1. Vessel should be inspected upon arrival for, (1) dead loss - greater than 10% is cause to closely examine entire catch for other problems; (2) diesel contamination - any evidence of diesel should result in rejection; and (3) overall catch condition - live, vigorous crab, of proper size and no evidence of contamination or mishandling to affect overall quality is desired.
2. Vessel should pump down tanks immediately before unloading commences. Brailers, buckets, or other apparatus can be used to move crab to hopper, live tank, or other holding apparatus. Dead crab are to be rejected, as are small crab, crab other than the genus *Paralithodes* and species *camschatica*, *brevipus* or *platypus*. Unloading containers should be cleaned daily.

Rejected live crab should be thrown overboard to prevent dying, and dead crab should be deck-loaded and removed after vessel has put out to sea.
3. When off-loading, unloaders should count specified number of crab into brailer or other container. This should then be accurately weighed (a) to insure proper payment to vessel

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 27 OF 127

Name _____

Date April, 1981Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

owner and (b) to obtain an accurate size average on the catch. Scales are to be checked regularly using standard weights. Scale types should be accurate $\pm .5\%$ of weight.

4. Catch Holding

- a. Live tanks - should be filled with circulating sea-water of the proper temperature and salinity to keep crab alive and vigorous, (2 to 10°C, pH 6.8 to 7.2, salinity, 34 salometer degrees). There should be no possibility of contamination from sewage, bilge, or other sources. Water must meet Alaska Department of Environmental Conservation standards.
- b. Brailers - should be hung in sea-water if not to be used within one to 1.5 hours. Should be away from effluent outfalls and other sources of contamination.
- c. Hoppers - should be filled when shift begins, and emptied at meal time to prevent crab from dying. When using buckets or brailers, load as gently as possible to minimize breakage.

B. BUTCHERING

1. At this point, and throughout the rest of the processing flow, GMP's and FDA regulations are rigidly enforced (e.g., hair-nets, hand dips, etc). Contamination is to be avoided in all previous steps also.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 28 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

2. Only live crab should be butchered - any with sour or musty odors in the butchered sections, or under size crab, should be discarded.
3. Equipment used for butchering.
 - a. Metal bar or spike with vertical butchering blade.
 - b. Heavy-duty apron for butchers.
4. Procedure for butchering.
 - a. Grasp left-side and right-side legs firmly in either hand.
 - b. Force belly portion of crab onto blade.
 - c. Pull up and out to separate crab into two halves, or sections. Most of viscera and entire carapace will fall free into gut chute or belt.
 - d. Give slight shake to remove any remaining viscera, and also to facilitate bleeding.
 - e. Tails should be shaken to remove any loose viscera.
5. Gilling. At this point, gills are removed from body meat by brushes, roller, or dull knives. All gill must be removed. Mouth parts or other extraneous material is also removed at this point.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab, &
Name Frozen Salmon
Date March, 1980
Issue Draft
SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 29 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

In some cases, king crab is left "gills-on". In this case, omit this step.

6. Washing is then done via a shower-belt arrangement or soaking bins. Water must be sanitary quality and should be chlorinated to a .5 to 3.0 ppm residual. This removes any residual gut or blood.

C. PACKING - FOR BATCH COOKERS

1. Crab are packed in baskets with shoulders facing out and legs straightened to facilitate cooking. (After freezing, the legs will lock together via ice formation, and this will minimize breakage in transit).
2. Crab should be packed tightly but care should be taken to minimize breakage at this point. Over-packing of baskets can also result in the interior portion being inadequately cooked. (Optimum weight is 180 to 200 pounds - 90 to 100 pound cases).
3. Tails should be cleaned of all viscera prior to packing. Over-packing of tail baskets frequently results in under-cooked tails in the center of the basket, so extra care should be taken in this step to insure proper pack. (Never over 100 pound cases). Cook time for tails is identical to sections.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 30 OF 116

Name

Date

March, 1980

Issue

Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight case:
 Gross Weight case:
 Container Code:

PROCESS PROCEDURE

4. Baskets should be in good repair with no loose metal as a potential contaminant. They should be cleaned with a boil-out cleaner or an adequate substitute on a regular basis.
5. Prior to cooking, the baskets may be immersed in a fresh or sea-water soak tank.

The soak tank should circulate water or else be changed on a regular basis to eliminate bacterial build-up. The dimensions of the tank should be sufficient to completely immerse a basket inside it.

D. COOKING

1. Batch Cooking.

- a. The cooker should be from 210°F to 212°F. If at anytime the cooker temperature drops below 208°F, additional time must be added to cook time for any period temperature is below 208°F.
- b. Cook times for king species range from 20 to 25 minutes depending upon size. For very small crab, a 20 minute cook is generally adequate. For crab averaging 5.5 to 6.5 pounds, a 22 minute cook is usually adequate. Large crab, such as "Blue" king crab (*Paralithodes platypus*) may take up to 25 minutes to cook thoroughly.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
 Dungeless Crab &
 Frozen Salmon
 Name _____
 Date March, 1980
 Issue Draft
 SUPERSEDES _____

CASTLE & COOKE FOODS
 MANUFACTURING SPECIFICATION
 PAGE 31 OF 116

Container type: _____
 Size Container: _____
 Weight Container: _____
 Units/case: _____
 Net Weight/case: _____
 Gross Weight/case: _____
 Container Code: _____

PROCESS PROCEDURE

A good indicator of proper cook time is the product core temperature. Immediately after removal from the cooker, the shoulder portion of the largest section should be probed using a metal-stem thermometer or other non-glass temperature measuring device. At least three measurements should be made per basket. As long as no core temperatures taken from the largest sections in the middle of the shoulder meat fall below 190°F, the cook time may be considered adequate. The cooker must be monitored at least every 15 minutes for proper temperature, as should the product.

2. Continuous Cookers.

- a. Cook temperature, and time is identical to that of batch cooker. Time is measured and adjusted by timing a chain and, in turn, timing the product. Due to the nature of the process, there is no packing step. Core temperatures and cooker temperatures must also be monitored on a regular basis, at least every 15 minutes.

E. COOLING AND CHILLING.

1. Immediately after the cook, product must be immersed in cool water. This may be sea-water or fresh water, should be sanitary and chlorinated to a 0.5 to 3.0 ppm residual.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab, &
Frozen Salmon

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 32 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

This "quenches" the cook and also lowers product temperature for further handling and the water temperature should be below 50°F.

Cooling may take place in either a flume or a tank. In either case, the circulating water must completely cover the product.

2. From the cooling tanks, if product temperature is still above 40°F, a chill tank is used to facilitate freezing. The chiller should be circulating sea or fresh water chlorinated to a 0.5 to 3.0 ppm residual. The temperature should be below 34°F, but should not cause icing on the refrigeration coils. Product should be held in the chiller until a temperature below 40°F is reached. Water and product temperature should be monitored at least every 15 minutes by Quality Control personnel.

F. BRINE FREEZING

1. Product temperature.
 - a. Must be below 40°F to avoid:
 - (1) Excess salt uptake.
 - (2) Water loss and dilution of brine.
 - (3) Warming of brine freezing solution.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS**

MANUFACTURING SPECIFICATION

Name Frozen SalmonPAGE 33 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

2. Brine Temperature.

- a. Must be below +5°F to avoid:

(1) Excess salt uptake.

- b. Must be above -6°F to avoid freezing of solution.

(The eutectic point of NaCl brine is -6°F, and should read 88.3 salometer degrees at 60°F using a standard salometer). (TP NO. 4).

3. Materials.

- a. Water must be sanitary quality.

- b. Salt (NaCl) must be food-grade. Stored salt must be handled in a sanitary manner. (Salt (NaCl) is considered a food ingredient when used in a brine freezing system.

4. Brine.

- a. Brine should be made in concentrations as close to saturated as possible. When changing tanks, care should be taken to keep concentration at maximum without exceeding 88 salometer degrees on the salometer. When adding warm brine, concentrations are frequently so high that it must be diluted to 87 to 88 salometer degrees, salinity using sanitary water prior to use.

- b. When adding brine while the system is in use, tank temperature must be monitored closely to prevent

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 34 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

excessive warming of the brine. Brine must always be added slowly to an operating brine freezer.

5. Brine must be below +2°F before product is immersed. Salinity should be above 84° on the salometer (90° at 0°F) to prevent icing of the coils. The optimum salinity is 88°, (94° at 0°F), but at this point must be watched closely, as greater concentrations of NaCl will actually elevate the freezing point of brine which can cause "salting up" of product. Coils are usually 5 to 10 degrees colder than the circulating brine, so temperatures or salinity which may not cause ice formation in the tank may cause icing of the coils, which insulates them and greatly impedes the efficiency of heat transfer that is vital for proper functioning of the brine system.
6. Freezing is considered complete when the product is completely solid when the exposed shoulder meat is probed with a sharp instrument such as an ice pick. Internal temperature of the product should be $\leq$ +10°F.

G. GLAZING OF BRINE-FROZEN PRODUCT

1. The baskets are allowed to drain 10 to 15 seconds after removal from the brine.
2. The baskets are completely immersed in FRESH water chlorinated to a 0.5 to 3.0 ppm residual, immediately removed and dipped

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12 '77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 35 OF 116Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____**PROCESS PROCEDURE**

again. There is no "soak time". This procedure constitutes a "double-dip" fresh water glaze, which all in-shell products must have. Glaze percentage varies between 5% and 12%. This is difficult to control due to the nature of processing. Glaze water must be kept circulating and new water added constantly to avoid "salting-up". Salt in the glaze water will result in an inferior glaze, and a potentially inferior product.

H. CASE-UP OF BRINE-FROZEN PRODUCT

1. Drop-doors are released from the baskets and each of the two 80 to 100 pound portions of the basket are covered with a poly liner (see "Packaging Specifications").
2. Poly-wrapped "block" of sections is "flipped" into wet-lock boxes (see "Packaging Specifications"), banded or stapled, weighed accurately.
3. Baskets must be rinsed in chlorinated (0.5 to 3.0 ppm) water before being re-used. All remaining crab pieces must also be removed. If to be stored before re-using, they must be cleaned prior to storage, and rinsed with a 50 ppm chlorine-water solution immediately before re-use. Baskets should be cleaned on a regular basis using cooker boil-out chemicals at the prescribed temperature for 5 to

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12 '77 King Crab, Snow Crab,
Dungeness Crab, &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 36 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

10 minutes to remove protein build-up and other deposits
that are not removed with normal rinsing.

I. CODING

1. Time Coding.

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
AK Cert#	Plant	Month	Day	Year	Period

- a. All Alaskan operations have certification number
AK 155.
- b. Plant ID:
 - A = M/V Royal Alaskan.
 - B = Barge Magellan.
 - C = Unalaska Shore Facility.
 - D = M/V Royal Sea
 - E = M/V Skookum Chief
 - F = M/V Royal Venture
 - G = M/V American No. 1
- c. Month: January = 1; February = 2; March = 3; etc.,
October = 0; November = N; December = D.
- d. Day of the Month.
- e. Year.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 37 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

f. Period.

A = 1st 6 hours of day shift.

B = 2nd 6 hours of day shift.

C = 1st 6 hours of night shift.

D = 2nd 6 hours of night shift.

2. Quality Coding.

Blast Grades

KFL BFL

KEL BEL

KSL BSL

Brine Grades

KFR BFR

KER BER

KSR BSR

"TAILS"

a. Last letter denotes how frozen: L = BLAST; R = BRINE.

b. First letter denotes product type:

K = KING CRAB (*Paralithodes camtschatica*)

B = BLUE KING CRAB (*Parolithodes brevipes*)

c. Middle letter denotes quality.

F = FOLDED. (#1 product marking also used in snow crab). All sections intact and legs straightened, but legs folded over each other. Barnacles, marine growth, and discoloration should not exceed 15% of total shell surface. (Must be full meat (50% meat)).

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 38 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight /case:
Gross Weight /case:
Container Code:

PROCESS PROCEDURE

S = FOR SPLIT LEG. Not exclusively for split leg, but to include all sections with full meat that are clean (see above), but broken.

E = FOR EXTRACTION. All product with heavy marine growth partially filled meat, or other quality-lowering characteristics that would preclude its sale as an in-shell item.

- d. Quality grading on blast and brine frozen product must be done at packing stage and baskets (or boxes, in the case of blast product) marked for proper handling in case-up.
- e. Cases are accurately weighed and marked before removed to cold storage. Scales are checked regularly by Quality Control personnel, using standard weights. This should be done on a shift-by-shift basis, or whenever use dictates.
- f. Cases marked "Tails" contain tails only.

J. BLAST FREEZING

- 1. Product must be removed from cooking baskets, flumes, or belts, and placed into wet-lock cardboard box bottoms or metal pans. Weights may be 13, 20, or 25 pounds NET, or whatever is specified by the buyer and/or Marketing.

A minimum of 5% of all boxes produced should be

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-5905
12-77 King Crab, Snow Crab
Dungeness Crab, &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 39 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight case:
Gross Weight case:
Container Code:

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

PROCESS PROCEDURE

check-weighed by Quality Control personnel. An 8 ounce water allowance is needed at the time of packing to make up for water lost due to drip loss before freezing and dehydration in the blast freezer. (This is the allowance commonly used for 25 pound cases, and should be adjusted as necessary.)

2. Product should be packed dorsal side up with legs straightened. Boxes should be packed neatly, and compactly as possible to minimize breakage of sections in transit.
3. Product should be frozen as soon as possible after packing to prevent weight loss due to drip and bacterial build-up. If it is not frozen within 60 minutes of packing time, it should be kept in a holding room at less than 45°F for a maximum of six (6) hours.
4. Blast freezer temperatures should be <-20°F. At these temperatures, freezing is fairly rapid. Freezing times vary due to differences in freezer design, amount of product frozen and temperature of in-going product. Product entering blast freezers should be less than 45°F to facilitate freezing.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 40 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

5. Operation of blast freezers should be as follows:
 - a. Freezer floor should be cleaned of all ice and water after removal of racks and defrosting coils.
 - b. All racks should be loaded into freezer, leaving maximum airspace possible between racks.
 - c. Door should be sealed and freezer turned on. DOOR SHOULD NOT BE REOPENED UNTIL FREEZING IS COMPLETED.
 - d. Temperature should be monitored regularly, as well as time in.
 - e. Freezer should be turned off and racks removed one at a time to the glazing operation.
6. Product should be removed as soon as possible after freezing of product is considered complete (core temperature below +5°F). Extended freezing time can cause dehydration of product and subsequent loss of both quality (due to "freezer burn") and recovery weight.

K. GLAZING OF BLAST-FROZEN PRODUCT

1. After removal from blast freezers, product should immediately be run through the fresh-water spray tunnels to glaze it. Glaze generally varies between 4% and 9%. Glaze water should be chlorinated to a 0.5 to 3.0 ppm residual.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 41 OF 116Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____**PROCESS PROCEDURE**

2. After glazing, containers should be allowed to drain on a 10° to 30° incline for at least 30 seconds.

L. CASE-UP OF BLAST FROZEN PRODUCT

1. After draining, product in metal pans should be removed and "flipped" into wet-lock box bottoms; the final product should be right-side up. The metal pans must be washed and sanitized using a 50 ppm chlorine solution (or accepted substitute) before re-use.
2. Tops are put onto box bottoms, and codes are stamped. Codes are identical to those used for brine-frozen product, except for quality coding (see "Coding"). Tops are strapped or stapled.

M. COLD STORAGE

1. After casing-up, product should be removed immediately to cold storage. Under no circumstances should product be left out longer than 60 minutes. Partial pallets should be removed to cold storage during meal times and between shifts.
2. Cold storage temperatures should be below +5°F. Below -5°F is desirable. Temperatures should be monitored by Quality Control personnel at least twice per shift.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 42 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

3. Product in cold storage should be separated from non-food items, such as bait. Product should be separated by production date as much as possible, and by product type.
4. Product should be arranged in cold storage "First-In; First-Out" to prevent delays in shipping of first-run product.
5. Any broken or disfigured cases in cold storage should be removed and re-cased. All codes and leading marks must be transferred to the new case.

N. SHIPPING

1. When vans are used, van should be initially checked for cleanliness, then product should be loaded as quickly as possible. The van should be sealed, and the temperature monitored every three hours. Temperatures should be below +5°F, except during defrost cycles.
2. When freighters are used, product should be loaded as quickly as possible. Heavy rain or snow will coat boxes with ice and can lower strength of carton, so loading under these conditions should be discouraged.
3. Accurate records and bills of lading are of utmost importance. Notify receiving operations as soon as shipments are made.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Snow Crab**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION

Name _____

PAGE 43 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

0. MONITORING OF THE PROCESSING FLOW

1. The following points are to be monitored by Quality Control and Production personnel.
 - a. Overall quality of incoming crab. Inspect for contaminants, defects, etc. Log results hourly, or as needed.
 - b. Sanitary condition of entire plant, including all processing areas and machinery, storage areas, and cold storage. Includes general condition of plant exterior and grounds, and problems therein, such as chipping paint, or rodent/insect infestation. This should be done once per shift. Preventative programs of rodent control, insect control, etc., are undertaken by the Quality Control Department.
 - c. Sanitary practices of all employees. Generally referred to as GMP's, this includes all situations or practices that could be considered potentially hazardous or could possibly result in product contamination or lowering of product quality.
 - d. Cooker temperatures should be monitored every 15 minutes. (TP NO. 1).

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 44 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

- e. Cooked product temperature should be monitored every 15 minutes. (TP No. 1).
- f. Chiller temperature should be monitored every 15 minutes (TP NO. 1).
- g. Chilled product temperature should be monitored on every basket before immersing it in brine. (TP NO. 1).
- h. Brine temperature and salinity should be monitored every 15 minutes. (TP NO. 1).
- i. Every basket emerging from the brine should be checked to insure it is frozen properly. (TP No. 1).
- j. After glazing, two or three samples should be taken per shift to determine the percent glaze on the product. (TP NO. 2).
- k. Salt determinations should be performed at least twice daily, and also whenever processing procedures indicate that excess salt uptake may have occurred.
- l. Blueing samples should be taken hourly to insure adequate cook time. (TP NO. 3). These samples should be returned to processing line if negative. Additional samples should be taken whenever processing procedures indicate undercooking may have occurred. When this happens, a minimum of three samples per basket should be taken.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 45 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

- m. Codes should be checked on a period basis to make sure they are correct.
- n. All scales should be checked twice per shift to insure accuracy. These include buying scales and case-up scales (brine and blast line).
- o. Blast freezer temperatures should be monitored every 30 minutes.
- p. Product from blast freezers should be checked to insure proper freezing. (TP NO. 1).
- q. The cold storage area temperature should be monitored twice daily.
- r. Product being loaded into vans and/or freighters should be checked to insure proper temperature. (TP NO. 1).
- s. Bacteriological samples should be taken daily. One sample per line is sufficient, unless contamination is suspected. processing water should be examined daily for coliforms (TP NO. 5).
- t. On a boat-by-boat basis, samples should be taken after the cook, and hand extracted to determine the total percent meat in an average section for this load.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 46 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

VI.

SNOW CRAB MEAT PRODUCTIONA. RECEIVING

1. Vessel should be inspected upon arrival for, (1) dead loss - greater than 10% is cause to closely examine entire catch for other problems; (2) diesel contamination - any evidence of diesel should result in rejection; (3) overall catch condition - live, vigorous crab, of proper size and no evidence of contamination or mishandling to affect overall quality is desired.
 2. Vessel should pump down tanks immediately before unloading commences. Brailers, buckets, or other apparatus can be used to move crab to hopper, live tank, or other holding apparatus. Dead crab are to be rejected, as are small crab, crab other than the genus Chionocetes and species Bairdi, and females of any species. Species Opilio may be accepted if agreed upon by buyer. Unloading containers should be cleaned daily.
- Rejected live crab should be thrown overboard to prevent dying, and dead crab should be deck-loaded and removed after vessel has put out to sea.

NOTE: The terms "section" and "cluster" will be used interchangeably to denote the end product of butchering crab for shell product.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 47 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

3. When off-loading, unloaders should count specified number of crab into brailer or other container. This should then be accurately weighed (a) to insure proper payment to vessel owner; (b) to obtain an accurate size average on the catch. Scales are to be checked regularly using standard weights.
4. Catch Holding.
 - a. Live tanks - should be filled with circulating seawater of the proper temperature and salinity to keep crab alive and vigorous. There should be no possibility of contamination from sewage, bilge, or other sources.
 - b. Brailers - should be hung in sea-water if not to be used within 1 to 1.5 hours. Should be away from effluent outfalls and other sources of contamination.
 - c. Hoppers - should be filled when shift begins, and emptied at mealtimes to prevent crab from dying. When using buckets or brailers, load as gently as possible to minimize breakage.

B. BUTCHERING

1. At this point, and throughout the rest of the processing flow, GMP's and FDA regulations are rigidly enforced, (e.g., hair-nets, hand dips, etc.). Contamination is to be avoided in all previous steps also.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 48 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

2. Only live crab should be butchered - any with sour or musty odors in the butchered sections should be discarded.
3. Equipment used for butchering.
 - a. Metal bar or spike with vertical butchering blade.
 - b. Heavy-duty apron for butchers.
4. Procedure for butchering.
 - a. Grasp left-side and right-side legs firmly in either hand.
 - b. Force belly portion of crab onto blade.
 - c. Pull up and out to separate crab into two halves, or clusters. Most of the viscera and entire carapace will fall free into gut chute or belt.
 - d. Give slight shake to remove any remaining viscera, and also to facilitate bleeding.
5. Gilling. At this point, gills are removed from body meat by brushes, roller, or dull knives. All gill must be removed. Mouth parts or other extraneous material is also removed at this point.
6. Washing is then done via a shower-belt arrangement or soaking bins. Water must be sanitary quality and should be chlorinated to a .5 to 3.0 ppm residual. This removes any residual gut or blood.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 49 OF 116Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

C. PACKING - FOR BATCH COOKERS

1. Crab are packed in baskets with shoulders facing out and legs straightened to facilitate cooking. (After freezing, the legs will lock together via ice formation, and this will minimize breakage in transit).
2. Crab should be packed tightly but care should be taken to minimize breakage at this point. Over-packing of basket can also result in the interior portion being inadequately cooked. (Optimum weight is 180 to 200 pounds - 90 to 100 pound cases).
3. Baskets should be in good repair with no loose metal as a potential contaminant. They should be cleaned with a boil-out cleaner or an adequate substitute on a regular basis.
4. Prior to cooking, the baskets may be immersed in a fresh or sea-water soak tank.

The soak tank should circulate water or else be changed on a regular basis to eliminate bacterial build-up. The dimensions of the tank should be sufficient to completely immerse a basket inside it.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 50 OF 116Name _____
Date March, 1980
Issue DraftContainer type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight /case: _____
Gross Weight /case: _____
Container Code: _____

SUPERSEDES _____

PROCESS PROCEDURE

D. COOKING

1. Batch cooking, continuous cooker - first stage.
 - a. The cooker should be 145°F to 150°F. Temperature at this point is not as critical as for in-shell product.
 - b. Cook time is 6 to 8 minutes, depending upon size.
During this cook, meat is heated in the shell sufficiently to allow removal in one piece, but no more, as fully cooked meat is difficult to extract. Core temperature on product exiting the first stage cooker should be 130°F to 140°F.
 - c. Prior to cooking, claws are removed and cooked in the standard 18 minute cook, as claw meat is not included in meat packs.
2. Extraction.
 - a. Legs are sawn from shoulder portion just below the point at which they connect to the shoulder (on the initial 1" of the merus segment, where it first attains full dimension).
 - b. Bodies are rolled on body rollers, legs are rolled on leg rollers. Tolerances on these rollers must be carefully adjusted to provide complete extraction

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 51 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

without breaking the meat - especially the merus segment. Incomplete extraction will result in a loss of recovery, and broken meat will lower quality and grade of the pack.

- c. Extracted meat is flumed or conveyed to the secondary cooker.

3. Secondary Cook - Second Stage.

- a. This must take place as soon as possible after the first cook, to avoid the blueing reaction. Under no circumstances should the time period between first and second state cook exceed 15 minutes.
- b. Steam or blanch cooker.
- (1) These cookers tend to lower recovery (as opposed to water immersion cooker), but are much less labor intensive than other systems.
 - (2) Cooker temperature should be 208°F to 212°F.
 - (3) Cook time is 2.5 to 3.5 minutes.
 - (4) Product should be no more than 1" deep on any portion of the belt to avoid under-cooking in center of product.
 - (5) Product temperature should be 170° to 180°F.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

Kir. Crab, Snow Crab,
Dungeness Crab, &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 52 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

- (6) Immediately after the cook, product should be cooled, using cool water spray, to a temperature less than 50°F. Water used may be fresh or sea-water, should be sanitary quality, and chlorinated to a 0.5 to 3.0 ppm residual.

c. Water Immersion Cook.

- (1) Recovery is generally higher in these cookers due to less severe drying action than live steam.
- (2) Product is placed into wire-mesh baskets that have been previously sanitized. A maximum of ten pounds should be placed in the baskets.
- (3) Cooker temperature should be 208° to 212°F.
- (4) Cook time is 3 to 4 minutes, depending upon volume to be cooked.
- (5) Product temperature should be 170° to 180°F.
- (6) Immediately after the cook, the baskets containing the product should be lowered into cool circulating chlorinated fresh or sea-water of sanitary quality. Product temperature should be below 50°F prior to removal. Alternatively,

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 53 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

the cooked product may be spread onto a belt
and cooled via a spray as described in 3. b.
(6), above.

4. After cooling to a temperature at which it can be easily handled and at which rapid bacterial build-up cannot occur, product should be picked by hand to remove all defects such as shell, tendon, membranes, and extraneous material such as gill or barnacles.

Black light "tents" may be used to facilitate isolation of tendon and shell via their florescence under the light of this wave length.

NOTE: A single stage cook, identical to that used for sections, may also be used, but this generally results in a lower quality pack when the meat is extracted. If this method is employed, the meat may be removed by hand or via rollers, and is processed after extraction and cooling, identically to second-stage cook product.

This is the method of extraction generally used in Southern operations after thawing frozen sections in a 100°F to 120°F thaw tank for 15 to 18 minutes. As in other operations, claws are not extracted, and must be refrozen and glazed.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 54 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

As a note, blast frozen product is rarely extracted, as the blast freezing process causes meat to adhere to the interior of the shell more than single-cook brine-frozen product.

E. FREEZING

1. Freezing takes place in "contact" or "plate" freezers, and usually takes between 6 and 8 hours.
2. Pans should be placed in plate freezers within 60 minutes after they are packed. If an extended period is anticipated, they should be kept below 45°F and frozen as soon as possible.
3. When loading the freezers, take care not to tip pans - this causes shifting of contents and unsymmetrical finished packs.

F. STORAGE

1. After the freezing process has been completed, the pans should be removed and separated from the block and liner. Unless the blocks are to be reglazed in additional processing within 72 to 96 hours, the top of the liner should be peeled back and the top reglazed. The liner top should then be replaced. Any blocks showing voids or areas that are not entirely frozen into the ice block due to a leaking liner should be thawed and reprocessed.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab,
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 55 OF 116Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

2. After reglazing block tops, blocks should be placed in poly lined totes or "4-15" cases (boxes designed to hold four fifteen pound blocks) for storage/shipment, and immediately removed to cold storage (see "Cold Storage" in either Snow Crab or King Crab Production Manufacturing Specifications.

G. GENERAL MONITORING

1. All sanitary plant practices that are practiced for section production are also practiced in the meat-line operation.
2. Due to the higher potential for contamination in meat products versus in-shell products, extraordinary efforts in worker and plant sanitation are employed.
3. Possibility for product loss is higher in a meat-line operation than in other processes, so problem areas such as rollers, transfer points, cookers and pack specifications are monitored closely.
4. Drained weights of products, as mentioned above should be monitored at least two per period per pack (e.g., fancy, salad, rice) for unfrozen drains, and two blocks per shift per pack for frozen drains.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Crab

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 56 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

H. MICROBIOLOGICAL TOLERANCES

1. TPC - 50,000/gram.
2. E. Coli - 3.6/gram.
3. Coagulase Positive Staph - 50/gram.

VII.

KING CRAB MEAT PRODUCTION

A. RECEIVING.

1. Vessel should be inspected upon arrival for, (1) dead loss - greater than 10% is cause to closely examine entire catch for other problems; (2) diesel contamination - any evidence of diesel should result in rejection; and (3) overall catch condition - live, vigorous crab, or proper size and no evidence of contamination of mishandling to affect overall quality is desired.
2. Vessel should pump down tanks immediately before unloading commences. Brailers, buckets, or other apparatus can be used to move crab to hopper, live tank, or other holding apparatus. Dead crab are to be rejected, as are small crab, crab other than the genus Paralithodes and species Camtschatica, brevipus or platypus. Unloading containers should be cleaned daily.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICE:

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 57 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

Rejected live crab should be thrown overboard to prevent dying, and dead crab should be deck-loaded and removed after vessel has put out to sea.

3. When off-loading, unloaders should count specified number of crab into brailer or other container. This should then be accurately weighed (a) to insure proper payment to vessel owner and (b) to obtain an accurate size average on the catch. Scales are to be checked regularly using standard weights.
4. Catch Holding.
 - a. Live tanks - should be filled with circulating sea-water of the proper temperature and salinity to keep crab alive and vigorous. There should be no possibility of contamination from sewage, bilge or other sources.
 - b. Brailers - should be hung in sea-water if not to be used within 1 to 1.5 hours. Should be away from effluent outfalls and other sources of contamination.
 - c. Hoppers - should be filled when shift begins, and emptied at meal time to prevent crab from dying. When using buckets or brailers, load as gently as possible to minimize breakage.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 58 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

B. BUTCHERING

1. At this point, and throughout the rest of the processing flow, GMP's and FDA regulations are rigidly enforced (e.g., hair-nets, hand dips, etc.). Contamination is to be avoided in all previous steps also.
2. Only live crab should be butchered - any with sour or musty odors in the butchered sections should be discarded.
3. Equipment used for butchering.
 - a. Metal bar or spike with vertical butchering blade.
 - b. Heavy-duty apron for butchers.
4. Procedure for butchering.
 - a. Grasp left-side and right-side legs firmly in either hand.
 - b. Force belly portion of crab onto blade.
 - c. Pull up and out to separate crab into two halves, or sections. Most of the viscera and entire carapace will fall free into gut chute or belt.
 - d. Give slight shake to remove any remaining viscera, and also to facilitate bleeding.
 - e. Tails should be shaken to remove any loose viscera.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

Name Frozen SalmonPAGE 59 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

5. Gilling. At this point, gills are removed from body meat by brushes, roller, or dull knives. All gill must be removed. Mouth parts or other extraneous material is also removed at this point.

In some cases, king crab is left "gills on". In this case, omit this step.

6. Washing is then done via a shower-belt arrangement or soaking bins. Water must be sanitary quality and should be chlorinated to a .5 to 3.0 ppm residual. This removes any residual gut or blood.

C. PACKING - FOR BATCH COOKERS

- Crab are packed in baskets with shoulders facing out and legs straightened to facilitate cooking.
- Crab should be packed tightly but care should be taken to minimize breakage at this point. Over-packing of baskets can also result in the interior portion being inadequately cooked. (Optimum weight is 180 to 200 pounds - 90 to 100 pound cases).
- Tails should be cleaned of all viscera prior to packing. Over-packing of tail baskets frequently results in under-cooked tails in the center of the basket, so extra care should be taken in this step to insure proper pack.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 60 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

4. Baskets should be in good repair with no loose metal as a potential contaminant. They should be cleaned with a boil-out cleaner or an adequate substitute on a regular basis.
5. Prior to cooking, the baskets may be immersed in a fresh or sea-water soak tank.
The soak tank should circulate water or else be changed on a regular basis to eliminate bacterial build-up.
The dimensions of the tank should be sufficient to completely immerse a basket inside it.

D. COOKING

1. Batch Cooking.
 - a. The cooker should be from 210°F to 212°F. If at anytime the cooker temperature drops below 208°F, additional time must be added to cook time for any period temperature is below 208°F.
 - b. Cook time for king species range from 20 to 25 minutes depending upon size. For very small crab, a 20 minute cook is generally adequate. For crab averaging 5.5 to 6.5 pounds, a 22 minute cook is usually adequate. Large crab, such as "Blue" king crab (*Paralithodes platypus*) may take up to 25 minutes to cook thoroughly.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab,
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 61 OF 116

Name _____

Date March, 1980

Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

A good indicator of proper cook time is the product core temperature. Immediately after removal from cooker, the shoulder portion of the largest section should be probed using a metal-stem thermometer or other non-glass temperature measuring device. At least three measurements should be made per basket. As long as no core temperatures taken from the largest sections in the middle of the shoulder meat fall below 180°F, the cook time may be considered adequate.

NOTE: Blue king crab are rarely used for meat products. The cooker must be monitored at least every 15 minutes for proper temperature, as should the product.

2. Continuous Cookers.

- a. Cook temperature, and time is identical to that of batch cooker. Time is measured and adjusted by timing a chain, and, in turn, timing the product. Due to the nature of the process, there is no packing step. Core temperatures and cooker temperatures must also be monitored on a regular basis, at least every 15 minutes.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 62 OF 116Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

E. COOLING

1. Immediately after the cook, product must be immersed in cool water. This may be sea-water or fresh water, and should be sanitary and chlorinated to a 0.5 to 3.0 ppm residual. This "quenches" the cook and also lowers product temperature for further handling and the water temperature should be below 50°F.

Cooling may take place in either a flume or a tank. In either case, the circulating water must completely cover the product.

F. EXTRACTION.

1. For best results, crab should be 60° to 80° when extracted. At this temperature, however, bacterial build-up occurs rapidly, so care must be taken and the product handled as quickly as possible.
2. Legs are rolled via "leg rollers". These rollers must be carefully adjusted to insure complete extraction without breaking leg meats, which can lower product quality.
3. Shoulders are shaken or "blown" using water or air. If water is used, it must be chlorinated and sanitary. Air also must be sanitary and filtered if necessary to remove oil, dirt, or other contaminants.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 63 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

4. After extraction, meat is flumed or conveyed via other means to a de-watering belt and a "picking station". At the "picking station", gill, tendon, shell, barnacle, pearl, grit, and other extraneous material is removed from the meat. A black light tent is frequently used to detect shell, as shell will floresce at this wave length.
5. Meat production in Southern Operations is accomplished through use of frozen sections or tails which are thawed in a tank at 100° to 120°F for 15 to 18 minutes. After thawing, the product is processed identically to fresh product.
6. Tails are extracted by hand or by rollers. After extraction, they are washed, and all remaining viscera is removed by hand.

G. PACKING

1. All products are packed in metal pans with paper liners. All pans must be sanitized prior to use and liners must be sanitary.

H. FREEZING

1. Freezing takes place in "contact" or "Plate" freezers, and usually takes between 6 and 8 hours.

MULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 64 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

2. Pans should be placed in plate freezers within 60 minutes after they are packed. If an extended period is anticipated, they should be kept below 45°F and frozen as soon as possible.
3. When loading the freezers, take care not to tip pans - this causes shifting of contents and unsymmetrical finished packs.

I. STORAGE

1. After the freezing process has been completed, the pans should be removed and separated from the block and liner. Unless the blocks are to be reglazed in additional processing within 72 to 96 hours, the top of the liner should be peeled back and the top reglazed. The liner top should then be replaced. Any blocks showing voids or areas that are not entirely frozen into the ice block due to a leaking liner should be thawed and reprocessed.
2. After reglazing block tops, blocks should be placed in poly lined totes of "4-15" cases (boxes designed to hold four fifteen pound blocks) for storage/shipment, and immediately removed to cold Storage (see "Cold Storage" in either Snow Crab or King Crab Manufacturing Specifications).

LATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
 Dungeness Crab &
 Frozen Salmon
 Name _____
 Date March, 1980
 Issue Draft
 SUPERSEDES _____

CASTLE & COOKE FOODS
 MANUFACTURING SPECIFICATION
 PAGE 65 OF 116

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

J. GENERAL MONITORING

1. All sanitary plant practices that are practiced for section production are also practiced in the meat-line operation.
2. Due to the higher potential for contamination in meat products versus in-shell products, extraordinary efforts in worker and plant sanitation are employed.
3. Possibility for product loss is higher in a meat-line operation than in other processes, so problem areas such as rollers, transfer points, cookers, and pack specifications are monitored continuously.
4. Drained weights of products, as mentioned above, should be monitored at least two per period per pack (e.g., fancy, salad, rice) for unfrozen drains, and two blocks per shift per pack for frozen drains.

K. MICROBIOLOGICAL TOLERANCES

1. TPC - 30,000/gram.
2. E. Coli - 3.6/gram.
3. Coagulase Positive Staph - 50/gram.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 66 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

VIII. DUNGENESS CRAB (ALASKA)A. RECEIVING

1. Vessel should be inspected upon arrival for; (1) dead loss - more than 10% is cause to closely examine entire catch for other problems; (2) diesel contamination - any evidence of diesel should result in rejection; and (3) overall catch condition - live, vigorous crab, of proper size and no evidence of contamination of mishandling to affect overall quality is desired.
2. Vessel should pump down tanks immediately before unloading commences. Buckets or other apparatus can be used to move crab to hopper or live tank. Dead crab are to be rejected, as are small crab, females and soft shelled crab, unloaders should pinch legs as they put them in the bucket, if they feel soft the crab should not be put in the bucket. If over 50% of the crab appears to be soft shell, the boat should be rejected. Unloading containers should be cleaned daily.
3. When off-loading, unloaders should count number of crab going into first two or three buckets. This should be accurately weighed to insure proper payment to vessel

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 67 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

owner and to obtain an accurate size average on the catch.
 Scales are to be checked regularly using standard weights.

4. Catch Holding.

- a. Live tanks should be filled with circulating seawater of the proper temperature and salinity to keep crab alive and vigorous (2° to 10° C, salinity, 34 salometer degrees). There should be no possibility of contamination from sewage, bilge or other sources. Water must meet all Alaska Department of Environmental Conservation standards. Loaders should separate the dead crab from the living crab and grind them up after butchering is done.
- b. Hoppers should be filled when shift begins, and emptied at meal time to prevent crab dying. When using buckets, load as gently as possible to minimize breakage.
- c. Sorting. All crabs should be examined for missing claws or two major legs or, again, for soft shell and separated from the rest. These will be butchered while the others will go into the mesmerizing tank.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 68 OF 116Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

B. MESMERIZING TANK

1. The crabs which have no missing claws or no more than one missing major leg, or are not soft-shell or have a broken back shell, should go into the mesmerizing tank.
2. The temperature ranges for the tank should be from 130° to 170°F and time of immersion in the water should be about 80 seconds.
3. This will cause the crab to fold their legs in toward their bodies and also to become inactive.
4. As the crab emerge from the tank, they should again be examined for missing legs and claws and soft shell. These should be separated from the good crab and butchered into sections.
5. Legs and claws that break off in the mesmerizing tank are caught in a basket and packed with the sections.

C. TRANSFER BELT

1. The unbroken crab coming out of the mesmerizing tank should be placed on their backs onto the transfer belt where people with brushes should scrub the bottom and top of shell.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

Name

Date

Issue

March, 1980

Draft

SUPERSEDES

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 69 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight /case:
Gross Weight /case:
Container Code:

PROCESS PROCEDURE

2. Any crab missing a claw or two major legs, should be butchered.

D. BUTCHERING

1. Only live crab should be butchered. Any with sour or musty odors in the butchered sections should be discarded. Crab coming out of the mesmerizing tank with their legs hanging limp should be examined after being butchered.
2. Equipment used for butchering.
 - a. A metal blade.
 - b. Heavy-duty apron or complete set of rain gear for butchers.
3. Procedure for butchering.
 - a. Grasp left side and right side legs firmly in either hand.
 - b. Force belly portion of crab onto spike.
 - c. Pull out on legs and separate crab into halves. Most viscera will fall onto gut belt. The carapace will remain on the spike.
 - d. Butchers should scrape off gills with thumb and give a slight shake to remove any remaining viscera, and to facilitate bleeding.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 70 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

4. Sections should be rinsed using sanitary quality water with a .5 to 3.0 ppm chlorine residual to remove any residual gut or blood and packed with shoulders facing out.

E. PACKING

1. From the transfer belt, the crab are placed on the packing belt.
2. The crab legs should then be rubber banded.
 - a. One person will hold the crab's body with legs and claws folded in while another person will place a rubber band around the legs to keep them folded on one side and then on the other side.
 - b. The rubber banded crab are then packed in baskets.
3. The crab are packed flat on their back in the basket. Over-packing of baskets should be avoided to minimize the breaking occurring at this point and also prevent the possibility of inadequately cooking the interior portion. Optimum weight is 160 to 190 pounds per basket.
4. Baskets should be in good repair with no loose metal as a potential contaminant. They should be cleaned using

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 71 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

the high-pressure system on a regular basis (normally,
after each processing day).

F. COOKING

1. The cooker should be at a minimum of 210°F. If, at any time the cooker temperature drops below 208°F, additional time must be added to cook time.
2. Cook time for dungeness range from 12 to 18 minutes.
 - a. For dungeness sections, a 12 minute cook is generally adequate.
 - b. For whole dungeness, an 18 minute cook is usually adequate.
3. A good indication of proper cook time is the product core temperature. Immediately after being removed from the cooker, the shoulder portion of the largest section or the first joint of a whole cook should be probed using a metal-stem thermometer or other non-glass temperature measuring device. There should be at least four measurements made from each cook load. As long as no core temperatures fall below 180°F, the cook time may be considered adequate. The cooker temperature and product temperature must be monitored whenever any baskets come out of this tank.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 72 OF 116Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight /case: _____
Gross Weight /case: _____
Container Code: _____

PROCESS PROCEDURE

G. COOLING

1. Immediately after the cook, the product must be immersed in cool water. The water should be sanitary and chlorinated to about 1 - 3 ppm.
2. The crab should remain in the tank for approximately 30 minutes at 45-63°F (depending on the temperature of the continuous in-coming water).
3. The core temperatures coming out of this tank should range from mid 40's to the low 50's.

H. CHILLING

1. From the cool tank, the product gets immersed in chilled water. The water should be sanitary and chlorinated to 1.0 to 3 ppm.
2. The crab must remain for a minimum of 35 minutes or until the core temperature reaches 40°F to 45°F.
3. The temperature of the tank usually varies from the low 30's to the mid 40's.
4. One basket at a time is moved from the chill tank to the brine tank.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 73 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

I. BRINE FREEZING

1. Brine Temperature.

- a. Must be below +5°F to avoid excess salt uptake.
- b. Must be above -6°F to avoid freezing of solution.
- c. The average temperature should range between -1.0 to -5.0.
- d. No product shall be added unless brine temperature is lower than -1.5.

2. Brine Time.

- a. A product must remain the brine long enough to adequately freeze a product to an internal temperature of less than or equal to +10°F.
- b. A minimum of 40 minutes (usually an average of 50 minutes) has been found to be adequate to freeze whole dungeness, while a minimum of 35 minutes has been used for freezing sections.

3. Brine Salinity. To prevent the coils from freezing up, (getting an ice coating on them and, therefore, losing much of their capabilities), brine salinity should be maintained between 92° and 95° when running at -4°F.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 74 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

4. Materials.

- a. Water must be sanitary quality.
- b. Salt (NaCl) must be food-grade. Stored salt must be handled in a sanitary manner. Salt is considered a food ingredient when used in a brine freezing system.

J. GLAZE TANK

1. Baskets are taken out of the brine tank and drained for about 10 seconds before being dunked into the glaze water and lifted up again. After initial glazing, the basket is again lowered in and immediately lifted to give product a double glaze. Glaze percentage varies between 5% and 12%.
2. The glaze water is fresh water. Sanitary, chlorinated (2-4 ppm) water is constantly going into the tank, thereby flushing out any salt which went into the water during the glazing procedure.

K. HOLDING VAN

1. Boxes should be immediately loaded onto a covered pallet until it is full and transported to a holding van.
2. The temperature of the van should be at about 0°F.
3. After the van is full, it is shipped with a -5°F setting on its thermostat.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name

Date

March, 1980

Issue

Draft

SUPERSEDES

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 75 OF 116Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

L. CODING

1. Time Coding.

1	2	3	4	5	6
AK Cert #	Plant	Month	Day	Year	Period

a. All Alaskan operations have certification number
AK 155.

b. Plant I.D.

A = M/V Royal Alaskan

B = Barge Magellan

C = Unalaska Shore Facility

D = M/V Royal Sea

E = M/V Skookum Chief

F = M/V Royal Venture

G = American #1

c. Month - January = 1; February = 2; March = 3; etc.,
October = 0; November = N; December = D.

d. Day of the Month.

e. Year.

f. Period.

A = 1st 6 hours of day shift.

B = 2nd 6 hours of day shift.

RMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 76 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

C = 1st 6 hours of night shift.

D = 2nd 6 hours of night shift.

M. SHIPPING

1. Vans should be initially checked for cleanliness, then product should be loaded as quickly as possible. Van should be sealed between loads going into it and the temperature should be monitored at least every three hours. Temperatures should be below 5°F, except during defrost cycles.
2. Accurate records and bills of lading are of utmost importance. Notify receiving operations as soon as shipments are made.

N. MONITORING OF THE PROCESSING FLOW

1. The following points are to be monitored by Quality Control and Production personnel.
 - a. Overall quality of incoming crab. Inspect for contaminants, defects, etc.
 - b. Sanitary condition of the entire plant, including all processing areas and machinery, storage areas, and cold storage. Includes general condition of plant exterior and grounds, and problems therein, such as chipping paint, or rodent/insect infestation. Preventative programs of rodent control, insect control, etc., are undertaken by the Quality Control Department.

MULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 78 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- c. Sanitary practices of all employees. This includes all situations or practices that could be considered potentially hazardous or could possibly result in product contamination, or lowering of product quality.
- d. Cooker temperatures should be monitored for every load.
- e. Cooked product temperatures should be monitored for every load.
- f. Cooler temperature should be monitored for every load.
- g. Cooled product temperature should be monitored on every load.
- h. Chiller temperature should be monitored for every load.
- i. Chilled product temperature should be monitored for every load before immersing them into the brine.
- j. Brine temperature and salinity should be monitored when a load goes in or is taken out of the tank.
- k. Each basket in brine is timed individually to insure product has been in brine for at least 40 minutes.
- l. Salt determinations should be performed at least on two samples daily, and whenever processing procedures indicate that excess salt uptake may have occurred.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 79 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- m. Blueing samples are randomly taken and checked in the laboratory. Additional samples should be taken whenever processing procedures indicate undercooking may have occurred.
- n. Codes should be checked on a period basis to make sure they are correct.
- o. All scales should be checked twice per day by Quality Control and at least twice per day by production to insure accuracy.
- p. The van temperature should be monitored at least once every two hours.
- q. Bacteriological samples should be taken daily from case-up table. If contamination is suspected, further samples should be taken.
- r. The total percent meat determination should be run on both sections and whole crab on a daily basis. Samples should be taken from the case-up table and hand extracted in the laboratory.
- s. See Dungeness Crab (Alaska) "Product Flow Chart" on next page.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS**

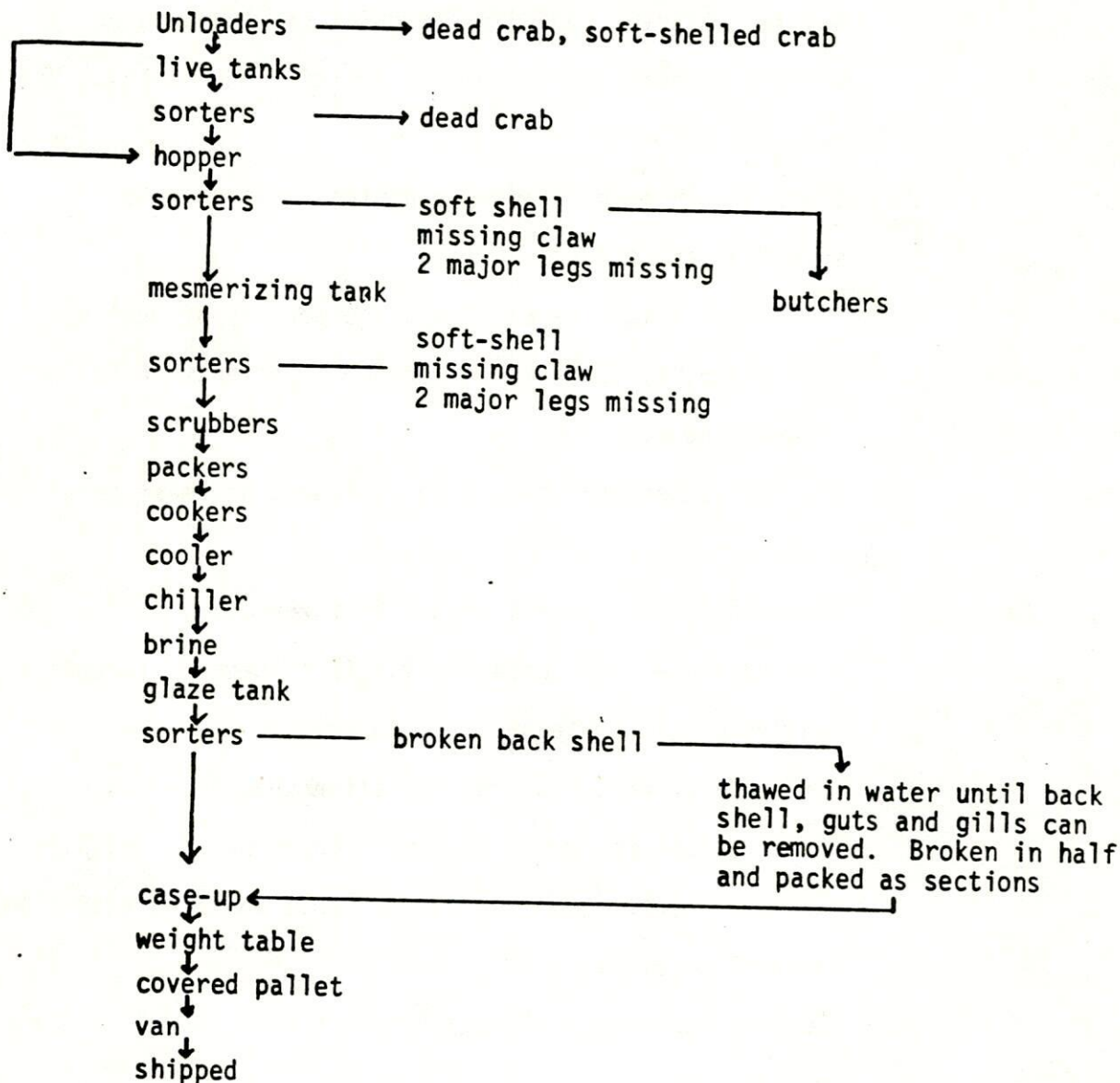
MANUFACTURING SPECIFICATION

PAGE 80 OF 116Name Frozen SalmonDate March, 1980Issue Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

DUNGENESS PRODUCT FLOW

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 81 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

IX. FRESH-FROZEN SALMON, UNALASKA SHORE PLANT

A. RECEIVING

1. The hold temperature of the tender should be checked and recorded. Temperatures of 30° to 31°F are optimum. Loads older than four (4) days from time of catch should be closely checked for signs of decomposition, either enzymatic or bacterial, and overall degradation. Holds with temperature exceeding 34°F should also be closely checked.
2. The hold should be checked for contamination of any type, especially diesel.
3. Fish should be checked for:
 - a. Temperature - insert thermometer through vent and record internal temperature.
 - b. General condition - firmness of flesh; bright red gills; scales not missing; bright eyes; seal bites; prop marks; or other external scars or blemishes. Fish with pugh marks should be rejected, and the plant manager notified.
 - c. Fish temperatures should be taken at various levels in the hold as unloading progresses. Top, middle, and bottom temperatures should be logged separately.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONName Frozen SalmonPAGE 82 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:**PROCESS PROCEDURE**

4. When unloading, fish should be handled as gently as possible. Fish should not be thrown or dropped from unnecessary heights. Fish should be handled by the gills and never by the tail to avoid breaking backbone. Since appearance is vitally important to marketing of fresh-frozen salmon, any procedure or practice that would adversely affect general appearance of the product must be strictly avoided.

5. After unloading, fish should be either:

a. Packed in totes containing crushed ice with an ice layer on top and bottom of not less than 3". Ice should be included in the middle of the tote also, as the fish are placed in it. Fish temperature from any area in the totes should not exceed 40°F.

OR

b. Placed in refrigerated sea water holding tanks at temperatures not below 30°F or above 34°F. Holding tanks should be monitored at least every two (2) hours as long as they contain product.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 83 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

c. Totes or holding tanks containing product must be cleaned and sanitized prior to use, and product in these containers should be adequately protected from the sun, birds, insects, and other sources of outside contamination.

6. In addition to the temperature and condition monitoring outlined above, the following data should be recorded on a daily basis by tender and species:

- a. Range and average length.
- b. Range and average weight.
- c. Area from which fish originated.
- d. Receiving dates from fishing vessels.

B. BUTCHERING

1. Fish brought into the processing area in iced totes should be processed within six (6) hours if possible, and always within twelve (12) hours. Additional ice should be added to product as needed to ensure proper temperatures.
2. No more fish than can be processed (butchered) within 20 minutes should be placed on the entrance area to the butcher table.
3. Princess Cut.
 - a. The belly should be slit by inserting a sharp knife into the vent and cutting in a smooth line up the

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 84 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:**PROCESS PROCEDURE**

middle of the belly to the area just above and between the pectoral fins. Approximately 1.5" of uncut skin should remain below the gill area. Great care must be taken to avoid cutting the meat inside the body cavity.

- b. Gills are removed by cutting points of attachment at rear of tongue and at top of the gill area.
- c. Viscera and gut is removed by inserting a finger into throat area from the body cavity and pulling out and away towards the tail. Care should be taken to remove all large pieces, especially around throat.
- d. Eggs are removed from other gut contents and processed immediately into "Sujiko".
- e. The kidney along the backbone is carefully slit and the contents scooped and washed out. The rest of the body cavity can also be rinsed of blood and other materials at this time.

C. WASHING - INSPECTION

1. Immediately after butchering, fish are washed and inspected to remove any gut or viscera remaining. A high pressure wash may be used on the body cavity but not on the fish exterior. The outer slime layer provides protection from

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 85 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

dehydration after freezing, and the scales are extremely important from an appearance standpoint in many markets.

D. VACUUM SEAL BAGGING

1. "Cryovac" and "Conovac" machines are commonly used.
2. Care must be taken to put fish into bag head first to avoid breaking the tail.
3. Bag closure must be adjusted to leave room for tail and not curl or bend it.
4. Vacuum should be adjusted to evacuate air from the bag completely without pinching fish or collapsing gut cavity so that it becomes inverted and belly meat is exposed. Excessive vacuum will also result in blood and body fluids being pulled from the meat which results in pockets of blood within the bag.

E. FREEZING

1. Brine Freezing.
 - a. Bagged fish are placed on wire mesh racks in wire mesh baskets with heads facing out. Care must be taken to overlap tails and lay them flat in the middle.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 86 OF 116

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

- b. Fish should be frozen as soon as possible after bagging. This eliminates the possibility of bacterial build-up and also prevents blood and body fluids from being pulled from the fish by the bag vacuum. Thirty (30) minutes is the maximum time between bagging and freezing.
- c. Brine temperatures are not as critical as with exposed products such as crab, however, brine temperatures should remain between -5°F and $+3^{\circ}\text{F}$ to facilitate freezing. Core temperatures of the frozen product must be below $+10^{\circ}\text{F}$. Generally, for red salmon, this can be accomplished in 3.5 hours. Factors such as fish size and brine temperature may cause this time to vary significantly however.
- d. Generally, if proper temperatures and times are employed for processing the fish, as outlined above, temperature of fish to be frozen is no problem. As a general rule, however, fish to be frozen should be below 45°F .

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONName Frozen SalmonPAGE 87 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- c. If necessary, bags may be rinsed after removal of brine to remove salt. If this is done, however, an allowance must be made if any "glaze" persists on the bag.

2. Blast Freezing.

- a. Fish are placed on metal racks which are put into blast freezers which have been defrosted, cleaned, and chilled.
- b. Metal racks are normally covered with plastic or some other non-stick coating prior to loading of fish to facilitate removal after freezing. It is important that the fish not stick to the racks, as this often results in loss of scales.
- c. After loading the freezers, the door is shut and the freezer turned on. Operating temperatures should be below -20°F .
- d. Operating temperatures of -20°F should be reached within 3 hours from the time the door is sealed.
- e. Freezing time of 5 to 7 hours at temperatures below -20°F are generally adequate depending on the size of the fish.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 88 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

F. GLAZING

1. Only non-bagged fish need be glazed.
2. Glazing should be done immediately after freezing to insure proper ice formation on the fish.
3. A product such as "FRO-DEX 42", Granular Coarse Corn Syrup Solids (manufactured by American Maize Products Company, Hammond, Indiana, 46326) will yield a high-quality glaze that is more resistant to dessication and fracture. It also gives the fish an appealing glass. The company recommends a concentration of 1/2 pound per 100 gallons of fresh water, but 2 - 3 pounds yields much more satisfactory results.
4. Only fresh water, chlorinated to a 1-3 ppm residual should be used for glazing.
5. Fish should be double-dip glazed. Glaze will vary depending upon size of fish, but should not be below 3%.
6. Glaze water should be kept as cold as possible, and ice is often used to lower its temperature. In this case, ice should be of sanitary quality.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 89 OF 116

Name

Date

Issue

March, 1980Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

G. CASE-UP AND CODING OF FROZEN SALMON

1. Case-up should take place immediately after removal of product from brine or blast freezers.
2. Fish are separated according to:
 - a. Species - boxes are to contain only one specie.
 - b. Size - boxes are to contain only one size range.
Examples are:
 - (1) Red - Salmon - under 3, 3 to 5, 5 to 6, 7 up.
 - (2) Pink Salmon - under 4, 4 up.
 - (3) Chum Salmon - 3 to 5, 5 to 7, 7 to 9, 9 up.
 - c. Tender - each box shall contain fish off-loaded from the same tender.
 - d. Grade - #1, #2, or #3 grade fish shall not be mixed.
 - e. Method of freezing - Blast and Brine frozen fish shall be separated into separate boxes.

3. Codes.

a. Species:

Red	R
Pink	P
Silver	M

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab, **CASTLE & COOKE FOODS**Dungeness Crab &
Frozen Salmon

MANUFACTURING SPECIFICATION

PAGE 90 OF 116

Name

Date

March, 1980

Issue

Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

King

K

Chum

C

- b. Size codes can be written on the box as shown above.
- c. Tender codes will be determined on a seasonal basis by selecting a letter to represent each tender, and following this schedule throughout the season (e.g., "V" for Vic Hansen).
- d. Grades are written or stamped as outlined above except #1 is A, #2 is B, #3 is C.
- e. Blast frozen product containers shall be stamped L, Brine product containers stamped R.
- f. In addition to the above codes, each box must contain the following:
 - (1) Alaska Certification number for plant producing the product (AK 155).
 - (2) Name and address of distributor (Pan-Alaska Fisheries, Inc., PO Box 647, Monroe, Washington 98272).
 - (3) Day, month, and year product is produced.

ULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 91 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- (4) Four hour period code from time product is produced (time at which it is loaded onto racks or into baskets).

EXAMPLE:

Unalaska brine frozen Red Salmon - 3-5 pounds,
#2 grade from Vic Hansen, cased-up at 10:15 AM
on July 17, 1979.

(Large) B
AK155C 7 17 9 B
RRV 3/5

Pan-Alaska Fisheries, Monroe.

4. After sorting and coding, boxes are to be strapped and removed as soon as possible to cold storage. A maximum of 90 minutes can elapse from case-up time until the product is placed in cold storage. Cold storage temperatures should not exceed +5°F, and temperatures below -10°F are optimum. The cold storage area should be clean and organized so that product can be arranged "first-in - first-out".

H. COLD STORAGE - SHIPPING

Shipping of product, whether on vans or via refrigerated freighters should be done in a way that allows no possibility

PLANT MANAGER:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 92 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

of damage to the product. Product should be loaded quickly and not allowed to warm up. Any broken or abused cartons should have their contents recased in another sound carton. Care must be taken to transfer all codes and box markings completely and accurately. Vans should be checked on a regular basis for proper holding temperature (less than +5°F), at intervals not to exceed six (6) hours. Cold storage facilities should also be checked at least twice daily for proper temperatures.

I. GENERAL PROCESSING GUIDELINES

1. All processing water (fresh or salt), must be chlorinated to a 1-3 ppm residual. Orthotolodine comparators or other procedures such as "Water-Chex" water test units (Aseptic-Thermo Indicator Company, 11471 Vanowen Street, PO Box 9338, North Hollywood, California 91609), may be used to check chlorination level as long as consistent, reproduceable results are achieved.
2. Only one species should be run at a time. This will eliminate many problems in coding and case-up.
3. When possible, a mixed load of fish should be presorted and iced after off-loading to help #2, above. An attempt should be made to process any pinks first, as this

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 93 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

species degrades far more rapidly than the others, even when iced.

4. Plant sanitation must be very strict, as this product is already dead and undergoing decomposition at the time of delivery. For this reason, break clean-up, and between shift clean-up must be done conscientiously and thoroughly.

J. MONITORING

1. Delivery.

- a. Temperature of the hold is taken - 30°F to 33°F.
- b. Fish temperature is taken from top, middle, bottom of the hold. At least six (6) fish from each area. should be sampled. Temperature must be less than 40°F, but fish must not be frozen.
- c. For each species delivered by each tender, weight and length measurements are taken and recorded as an average and a range. This is compiled at the end of the season by area and species.
- d. Fish are checked for general condition - external marks, age of catch, overall fish appearance. Fish are also checked for any signs of contamination.
- e. After butchering and washing, fish are again checked for condition, appearance and workmanship.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &**CASTLE & COOKE FOODS****MANUFACTURING SPECIFICATION**Name Frozen SalmonPAGE 94 OF 116Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:**PROCESS PROCEDURE**

- f. After vacuum sealing, bags should be inspected to ensure no loss of vacuum.
- g. After freezing, bagged fish should be inspected to ensure no loss of bag integrity.
- h. Glazed fish should be analyzed for percent glaze.
- i. Scales should be checked to ensure proper case weights.
- j. Cold storage and vans must be monitored regularly for proper holding temperature (below +5°F).
- k. Brine must be monitored at least every 30 minutes for proper salinity (88.3 salometer degrees at 60°F to 93 salometer degrees at 0°F), and proper temperature (-5° to +3°F).
- l. Off-loaded fish being held prior to processing should be checked to ensure proper internal temperature.
- m. Plant inspection during breaks and before start-up must be done on all processing areas and equipment.
- n. All plant personnel should be observed to ensure they are practicing GMP's.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATION
PAGE 95 OF 116Name _____
Date March 1980
Issue DraftContainer type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

SUPERSEDES _____

PROCESS PROCEDURE

X. FISH QUALITYA. CHARACTERISTICS IN DETERMINING FISH QUALITY

1. The Salmon Control Plan requires that all members have an active program of incoming fish inspection. One individual must be designated the Plant Fish Quality Inspector. This person must have some practical training, and may be the beach boss, fish sorter, plant foreman, fish house foreman, etc. This is a serious responsibility and the Inspector must be aware of it. Complete records must be maintained of the inspections made and are to be included in the daily canning records.
2. Each tender is to be inspected as it unloads. Prior to unloading, the Plant Fish Quality Inspector must talk to the tender captain to determine the approximate number of fish on board and any particular problems that may have occurred, such as a suspect load from one fishing boat, or loss of refrigeration, etc. Anything of this type should be recorded in the section noted "Remarks". When the boat starts unloading, the Inspector must record the time, temperature and condition of the fish. The fish

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

C&C-596
12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 96 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight case:
Gross Weight case:
Container Code:

PROCESS PROCEDURE

must be checked at one hour intervals, minimum, until the boat has completed unloading.

3. This form must be signed by the Fish Quality Inspector and signed or initiated by the Plant Superintendent when reviewing the daily canning records.
4. The following are the criteria to be used in determining the raw fish quality. All of the characteristics may not be present in all of the fish from a given class, but any fish that have a decomposed or sour odor are to be rejected. Unfortunately, if the fish are from a refrigerated sea water (brine) tender, the odor may not be detectable and the other criteria will have to be used. The Plant Superintendent must be notified if the fish are Class 4 or Class 5.
5. The Inspector must also watch for contamination of the fish by petroleum products.
6. The inspector should be aware of the odor of the brine. If the brine has a strong, objectionable odor, it is likely that the fish in it will be of poor quality.

B. COPIES

1. The round fish inspection report must be reviewed and initialed by the Plant Superintendent daily and copies sent to the Corporate Quality Assurance office in Seattle.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 97 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

C. CLASS, GRADE AND CHARACTERISTICSCLASSGRADECHARACTERISTICS

1

Good

- a. There is no odor on the surface of the fish.
- b. The eyes are bright and clear.
- c. The gills are bright red and have no odor.
- d. The flesh is firm and doesn't wrinkle when the fish is flexed.
- e. The skin is shiny.
- f. The backbone is firm and doesn't creak when the fish is flexed.
- g. The intestines are firm and bright.
- h. There is no odor present in the flesh.
- i. The internal body wall is bright and no bones are protruding.
- j. There is no evidence of watermarking.

2

Average

- a. There is no odor on the surface of the fish.
- b. The eyes are slightly cloudy and have some slight reddening.
- c. The gills are dull red (brine fish may have bleached out gills) and have no odor.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 98 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

3 Fair

- d. The flesh is firm and doesn't wrinkle when the fish is flexed.
- e. The skin is dull.
- f. The backbone is firm and doesn't creak when the fish is flexed.
- g. The intestines are firm and bright.
- h. The internal body wall is bright and no bones are protruding.
- i. There is no odor present in the flesh.
- j. There is no evidence of watermarking.
- a. There is no odor on the surface of the fish.
- b. The eyes are cloudy, slightly sunken and have some reddening of the area around the eye.
- c. The gills are dull (brine fish may have bleached out gills) and have a very slight odor.
- d. The flesh is slightly soft and wrinkles slightly when flexed.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 100 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

5 Reject

- g. The intestines are dark and starting to soften.
- h. The ribs and bones are starting to separate from the fish.
- i. The flesh has a slight mildly objectionable odor, which is not persistent.
- j. The fish are moderately watermarked.
- a. There is a strong objectionable odor on the surface of the fish.
- b. The eyes are cloudy, sunken and red.
- c. The gills are dull, greenish-brown (brine fish will have bleached out gills). They have a strong objectionable odor.
- d. The flesh wrinkles as the fish is flexed.
- e. The skin is dull.
- f. The backbone creaks when the fish is flexed.
- g. The intestines are dark in color and have liquefied.

MULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12.77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

Name _____

Date March 1980Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 99 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

4 Poor

- e. The skin is dull and the belly region has some very slight discoloration.
- f. The backbone creaks slightly when the fish is flexed.
- g. The intestines are firm but are starting to darken.
- h. The internal body wall is starting to darken.
- i. There is no odor present in the flesh.
- j. The fish are slightly watermarked.
- a. There is a slight, non-persistent odor on the surface of the fish.
- b. The eyes are cloudy, somewhat sunken, with some reddening of the area around the eyes.
- c. The gills are dull greenish-brown (brine fish will have bleached out gills). They have a slight odor of decomposition.
- d. The flesh wrinkles when the fish is flexed.
- e. The skin is dull and the belly region has some slight reddening.
- f. The backbone creaks when the fish is flexed.

SIMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name

Date

Issue

March 1980

Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 101 OF 116Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- h. The internal body wall is very red.
There are large areas of belly burn
and the bones have separated from
the flesh.
- i. The flesh has a strong, objectionable
odor.
- j. The fish are badly watermarked.

D. ORGANOLEPTIC ANALYSIS OF FOOD PRODUCTS¹

1. Organoleptic Analysis. Involves the employment of one or more of the physical senses (sight, touch, taste, smell) for subjective testing and rating of food products.
2. Physical Requirements of Organoleptic Examinations.
 - a. Work in an area that is free of distractions. Don't try to examine a product in a room where other types of analyses are being conducted.
 - b. Work in an area that is free of foreign odors.
 - (1) No smoking at any time.
 - (2) Cosmetic odors should be avoided.
 - (3) Don't attempt to smell something that is held in another person's hands.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab,
Frozen Salmon

Name

Date March 1980

Issue Draft

SUPERSEDES

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 102 OF 116

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

- c. A slight positive pressure should be maintained in the testing area so that extraneous odors cannot enter into the testing area. Proper ventilation also removes product odor.
 - d. Separate participants if possible.
 - (1) One person's reaction may affect another's judgment.
 - e. Lighting should be uniform, as near natural light as possible and not influence the appearance of product being tested.
 - f. Product to be tested should be at room temperature or slightly above. (This can vary some depending on product).
3. Other Considerations.
- a. Be as knowledgeable as possible about the product being examined.
 - b. Examine only one species or fish product at a time.
 - c. Take periodic rest breaks during the examination.
 - d. Conduct all determinations independently of other examiners and immediately record results.

¹Excerpt, H. Richard Throm
Food and Drug Administration
Seattle, Washington

LATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 103 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

4. Organoleptic Classifications of Decomposition.

a. CLASS 1 - PASSABLE.

This category includes fishery products that range from very fresh to those that contain fishy odors or other odors characteristic of the commercial product, not definitely identifiable as decomposition.

b. CLASS 2 - DECOMPOSED (SLIGHT BUT DEFINITE)

The first stage of definitely identifiable decomposition, an odor is present that, while not really intense, is persistent and readily perceptible to the experienced examiner as that of decomposition.

c. CLASS 3 - DECOMPOSED (ADVANCED)

The product possesses a strong odor of decomposition which is persistent, distinct and unmistakable.

5. Classes of Decomposition in Pacific Salmon.²

The following is a guide to be used in the organoleptic determination of decomposition in Pacific Salmon. It should be pointed out that all of the following characteristics may or may not be present for each classification, however, it

²By H. R. Throm
Seattle District

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen SalmonName _____
Date March, 1980
Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 104 OF 116Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

is necessary that a distinct odor of decomposition be present in order to judge a fish as Class 2 or Class 3.

- a. Class 1: This is the first stage after death. The fish has practically no odor or only a slight "fishy" odor. The eyes are bright and clear and the gills are bright red. The flesh is firm and exhibits no wrinkling when the fish is flexed. The skin is shiny with an irridescent appearance. The backbone is firm with no "creaking" when flexed. The viscera is firm and bright. The internal body wall is bright in color with no bones protruding. No decomposition is present.
- b. Class 2: The fish possesses a strong surface slime odor. The eyes are opaque, somewhat sunken, with a reddening of the area around the eyes. The gills are dull greenish-brown and exhibit an odor of decomposition. The back bone creaks and the skin is wrinkled when the fish is flexed. The flesh is moderately soft and the area around the body cavity is slightly reddened or "feverish". The viscera is darkened and starting to liquify. The ribs and bones

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 105 OF 116

Name

Date

Issue

March, 1980

Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

are beginning to separate from the flesh. An odor is present in the flesh, that while not really intense, is persistent and readily recognizable to the experienced examiner as that of decomposition.

- c. Class 3: The fish possesses an odor of decomposition on the surface of the fish. The eyes are opaque, sunken and red. The gills are dull greenish-brown in color and possess a very strong decomposition odor. The backbone "creaks" or separates easily. The flesh is soft and possesses a decomposition odor which is persistent, distinct and unmistakable. The viscera is dark in color, decomposed and liquifying. The body cavity wall is very red, exhibits large areas of "belly" burn and the bones are separated from the inner body wall.

6. Stages in Fish Spoilage:

(See attached chart).

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

STAGES IN FISH SPOILAGE

	<u>TISSUE CHANGES</u>	<u>ORGANOLEPTIC CHANGES</u>	<u>BACTERIAL COUNT</u>	<u>CHEMICAL CHANGES</u>
0-5 days in ice	Rigor mortis ATP → Inosine Sl. increase TMA Changes in Bacterial Types	Eyes bright Flesh firm Color good Gills bright Odor fresh	$10^2 \rightarrow 10^3$ bacteria/cm ²	TMA < 1-1.5 mgm% VRS < 2-8 units
5-10 days in ice	Bacterial growth becomes apparent Inosine - Ilypoxanthine TMAO → TMA NH ₃ increases	Eyes begin to dull Gill color fades Skin color fades Odor neutral to sl. fishy Texture softening	$10^3 \rightarrow 10^6$ bacteria/cm ²	TMA < 5 mgm% VRS ~ 5-10 units TVB < 15 mgm%
10-14 days in ice	Rapid bacterial growth Penetration of tissues Hypoxanthine → Xanthine, Uric acid, etc. TMA increases rapidly TVB & TVA increase	Eyes sunken Gills discolored & slimy Skin bleached Odor sour & fishy Texture soft	$10^6 \rightarrow 10^8$ bacteria/cm ²	TMA ~ 10 mgm% VRS ~ 10-15 units TVB 20-30 mgm% TVA 15-20 mgm%
Over 14 days in ice	Bacterial numbers stationary Some change of species General deterioration of flesh TVB & TVA increase rapidly TMA increases or levels off Proteolysis begins H ₂ S and other products formed	Eyes opaque & sunken Gills bleached & slimy Skin very slimy Texture very soft Odor offensive	10^8 bacteria/cm ²	TMA > 10 mgm% VRS > 20 units TVB > 30 mgm% TVA > 60 mgm% H ₂ S indole, etc. detectable

C&C-596
12/77

King Crab, Snow Crab
Dungeness Crab, &
Frozen Salmon

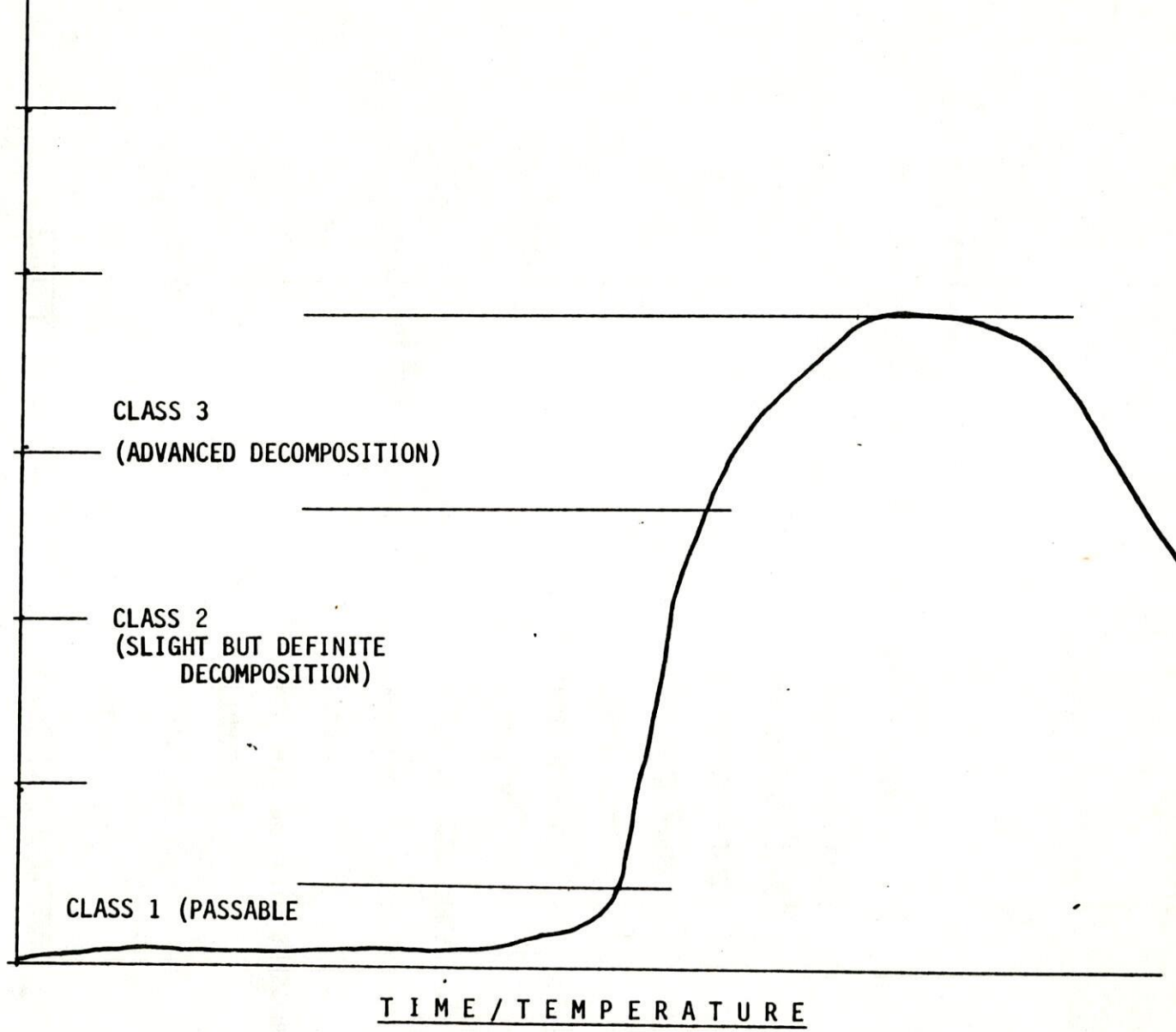
CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 106 OF 116

Name March, 1980
Date _____
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

DECOMPOSITION RATE



FORMULATOR: _____ TECHNICAL DIRECTOR: _____ CORPORATE ENGINEER: _____ PLANT MANAGER: _____ V.P. TECHNICAL SERVICES: _____

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 107 OF 116

Name _____

Date March 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

7. Chemical Confirmatory Indices.

PRODUCTCONFIRMATORY METHOD

SHRIMP

INDOLE

TUNA

HISTAMINES

ETHANOL

SALMON

VOLATILE REDUCING SUBSTANCES

ETHANOL

OTHER FISHERY PRODUCTS

AMMONIA

VOLATILE ACID NUMBER

FORMIC ACID

ACETIC ACID

SUCCINIC ACID

VOLATILE BASES

VOLATILE AMINES

MICROBIOLOGICAL

TRIMETHYLAMINE

8. How to Recognize Fish Quality and/or Defects:

(See attached chart)

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

HOW TO RECOGNIZE FISH QUALITY AND OR DEFECTS

ODOR	APPEARANCE	QUALITY	DISPOSITION
Natural Seafresh 1.	1. Bright red gills 2. Bright full eyes - jet black pupils. 3. Clinging scales, fresh slime 4. Firm flesh - responds to pressure 5. Fresh red blood, natural color 6. Interior flesh firm/ no loose bones 7. No water marks	Wholesome/Acceptable	Fresh Freeze Can Salt
Slight but persistent Brine Sour or Bilgy Fruity or Cabbage "Sweet" Gills not Seafresh Slime not Seafresh 2.	1. Eyes cloudy, sunken 2. Gills brown. Skin surface semi-dull 3. Moderate or slight flesh "belly burn" and feverish discoloration. Blood dark. 4. Slight viscera decomposition. 5. Rib bones loose. Flesh soft, loose scales. 6. Moderate or slight water marking.	Wholesomeness cannot be determined positively.	Good judgement and experience required Refer problems to Supervisor.
Strong and Persistent Tainted or Putrid Manure or Rotten Egg Sickly "Sweet" Dirty/Sweaty Sox Distinct Sour Ripe Cheese Distinct aroma of Phenol Gasoline, hydraulic oil, Fuel oil, other 3.	1. Eyes cloudy, red, sunken. 2. Gills brownish green/malodorous 3. Skin surface dull 4. Carcass very limp. 5. Distinct flesh "belly burn" and purple red discoloration. Rib bones very loose. 6. Viscera dark, and liquefying 7. Exterior severely water marked	Decomposed and/or Adulterated. Not Wholesome Not Acceptable Not for Human	Reject and/or Freeze for Bait Assign to Reduction Disposal

The primary damage to seafood wholesomeness occurs because of lack of temperature control to safeguard the fish flesh from destructive bacterial and enzymatic action immediately after catching. Feeding fish not only have bacteria in the gut and on the skin surface, but enzymes that are digesting the feed while the fish is alive, continue to digest the gut contents, gut lining, and the flesh after death occurs. Marine bacteria of the North Pacific grow very rapidly in temperatures of about 50°F, which is near the temperature of the water in which the fish live. When the fish is dead, the faster the carcass temperature can be lowered to the desired 32° - 34°F range, the greater control of spoilage causing bacteria and enzymes. ...

TEMPERATURE CONTROL IS CRITICAL, AND AWARENESS OF THIS FACTOR, AS THE FOOD PRODUCT MOVES THROUGH ALL PHASES OF CATCHING, TRANSPORTING AND PRODUCTION, CANNOT BE OVER EMPHASIZED!

12/77

King Crab, Snow Crab
Dungeness Crab &
Frozen SalmonCASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 108 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

XI. HOLD DISPOSITION ORDER PROCEDURE

Consecutively number HOLD ORDER forms are to be distributed to each plant.

HOLD ORDER NUMBERSPLANT

1 - 99

MONROE

100 - 199

BARGE MAGELLAN

200 - 299

UNALASKA SHORE PLANT

300 - 399

M/V ROYAL SEA

400 - 499

M/V SKOOKUM CHIEF

500 - 599

M/V ROYAL VENTURE

600 - 699

AMERICAN NO. 1

700 - 799

CATCHER PROCESSORS

For every product placed on HOLD by Quality Control, the following must be adhered to:

- A. In-Plant Quality Control is to fill out HOLD ORDER form completely with as much information as is available.
- B. HOLD tags are to be filled out with HOLD ORDER number and sequential case number and attached to each case on HOLD, if possible.
- C. If problem can be resolved in plant, Quality Control is to fill out DISPOSITION ORDER form and attach to corresponding HOLD ORDER

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab
Dungeness Crab
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 109 OF 116

Name _____
Date March, 1980
Issue Draft
SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

form (HOLD ORDER number is to be copied onto DISPOSITION ORDER FORM). All HOLD AND DISPOSITION ORDERS are to be sent to Quality Control, Monroe.

- D. If any problems cannot be resolved in plant, HOLD ORDER is to be sent to Quality Control, Monroe. Also, a copy of HOLD ORDER is to be attached to the Bill of Lading, and product sent to Monroe via Van rather than through vessel transport. HOLD product is to be consolidated into one shipment.

- E. Distribution of HOLD and DISPOSITION ORDERS is as follows:

White copy	Quality Control, Monroe
Yellow copy	In-Plant Quality Control file
Pink copy	Attach to Bill of Lading
Gold copy	In-Plant Production file
Green copy	In-Plant shipping and receiving

- F. In Monroe, Quality Control will distribute copies of all HOLD ORDERS for frozen product to:

Director, Quality Assurance, Monroe
Production Supervisor, Seattle
Supervisor of Quality Control (Pan-Alaska), Monroe
Supervisor of Quality Control, Monroe
Supervisor, Laboratory, Monroe
Marketing Representative, Monroe

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICE

12/77

King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon**CASTLE & COOKE FOODS**
MANUFACTURING SPECIFICATIONPAGE 109 OF 116

Name _____

Date March, 1980Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

Plant Superintendent, Monroe

Traffic Manager, Monroe

Foremen, Monroe

Shipping & Receiving, Monroe

- G. In Monroe, Quality Control will distribute copies of all HOLD ORDERS for canned product to:
Director, Quality Assurance, Monroe
Manager of Logistics and Analysis, Seattle
- H. When HOLD product is received at Monroe, Shipping and Receiving is to inform Quality Control immediately of HOLD ORDER numbers.
- I. If possible, Quality Control is to sample all HOLD product before warehousing. Otherwise, the disposition of such product must be a priority matter to be taken care of as soon as possible.
- J. All HOLD ORDERS numbers are to be copied onto inventory board pallet tags by Monroe Shipping & Receiving. A different color tag is to be used for HOLD product.
- K. After product has been inspected by Monroe Quality Control and disposition of product has been determined, Monroe Quality Control is to fill out DISPOSITION ORDER form completely and distribute to the above.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow
Dungeness Crab &
Frozen Salmon

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 110 OF 116

Name _____
Date March, 1980
Issue Draft

SUPERSEDES _____

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight /case: _____
Gross Weight /case: _____
Container Code: _____

PROCESS PROCEDURE

- L. DISTRIBUTION ORDERS should be attached to correlating HOLD ORDERS by all persons on distribution list.
- M. Monroe Shipping & Receiving is to inform Monroe Quality Control in advance of HOLD - DISPOSITION numbers of product to be run in production.

XII. MONITORING FORMS - UNALASKA

See attached

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

DRAIN WEIGHTS & PRODUCT PARAMETERS

DATE _____

TIME	PACK, %			TIME	PACK, %		
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	
		GROSS WT.				GROSS WT.	
		DRAIN WT.				DRAIN WT.	

% OF 13.5

MERUS COUNT		TOTAL MERUS		BITE SIZED		SHREDS	
		WT.	%	WT.	%	WT	%

EFFECTS AND/CE COMMENT:

% ACT. L DRAIN WT.		% DECLARED DRAIN $\geq$ 90%	
TOTAL MERUS		$\geq$ 20%	
SHREDS		$\leq$ 30%	
BITE SIZED			
WHOLE MERUS OF TOTAL MERUS			
# OF DEFECTS		$\leq$ 5/lb.	

RH

5-11-78

Pan-Alaska Fisheries, Inc.

A SUBSIDIARY OF CASTLE & COOKE INC.

P.O. BOX 647 / MONROE, WASHINGTON 98272 / 206 743-1176

TELEX 32 9425 PANAKFISH MNOR

Plant: _____ Date: _____ Inspector: _____ Product: _____

UNFROZEN

Time	Code	Weight (oz.)	%	Defects	Flavor	Remarks
		Gross Wt.				
		Drain Wt.				
		Drip Loss				
		Gross Wt.				
		Drain Wt.				
		Drip Loss				
		Gross Wt.				
		Drain Wt.				
		Drip Loss				

DAILY AVERAGE _____ %

FROZEN

Date	Code:									
Sample	Gross	Drain	Merus	White	Red	# of Merus Legs		Whole Segments		
						Broken	Whole	Weight	%	
# 1										
# 2						White Meat		Shreds		
						Weight	%	Weight	%	
# 3										
Total						Shoulders		Defects		
Drain						Number	Weight	%		
Percent										
Drain Weight										
Cooker F	Meat F	Thaw F	Thaw Time			Drip Loss	Merus Align	Top Finish	Symmet	

KING CRAB STANDARDS

TANNER CRAB STANDARDS

% Declared		Defects $\leq 1/Lb.$		% Declared		Defects $\leq 5/Lb.$	
Drain $\geq 90\%$				Drain $\geq 90\%$			
% Actual Drain Weight				% Actual Drain Weight			
* Merus $\geq 25\%$				Merus $\geq 20\%$			
Whole Merus $\geq 30\%$				Whole Merus $\geq 30\%$			
* Red $\geq 20\%$				Shreds $\geq 30\%$			
* White $\geq 55\%$							
Shreds $\leq 10\%$							

NATIONAL CANNERS ASSOCIATION

1133 20th STREET, N. W.
WASHINGTON, D. C. 20036

DEAR CANNERY EMPLOYEE:

The purpose of this booklet is to acquaint you with some important aspects of GOOD MANUFACTURING PRACTICES (GMPs). Involved in these are plant maintenance, plant operation, and the way in which each person carries out his assigned job.

By studying the information in this publication, you will be able to better accomplish your important task of providing consumers with clean, wholesome food.

Ira I. Somers

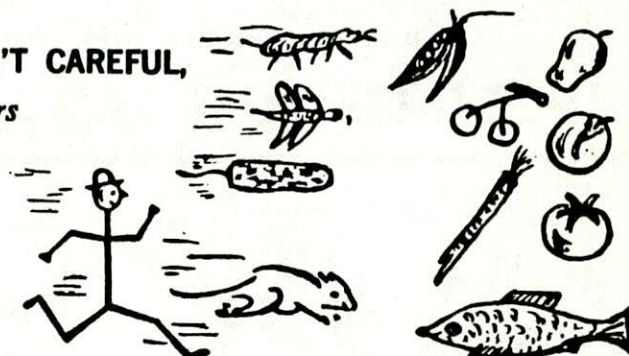
IRA I. SOMERS, Director
National Canners Association
Research Laboratories

COMPETITION FOR FOOD IN THIS WORLD IS GREAT

Man's chief *contenders* are insects, microorganisms, and animals.

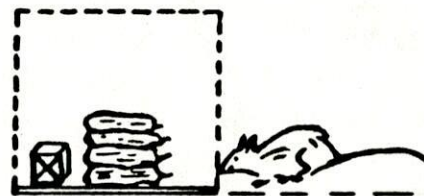
IF MAN ISN'T CAREFUL,

his *competitors*
will beat him
to it every
time.



TO PROTECT HIS FOOD FROM HIS COMPETITORS

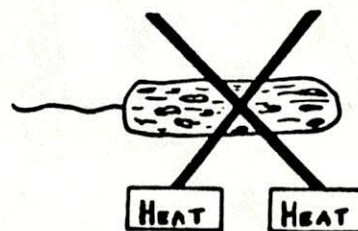
man uses many devices such as:



Screens to keep them out



Poisons to kill them

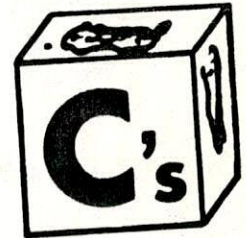
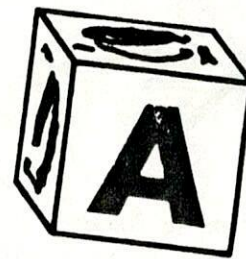


Heat or other means to
kill microorganisms

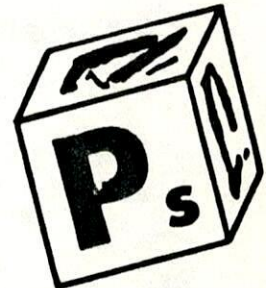
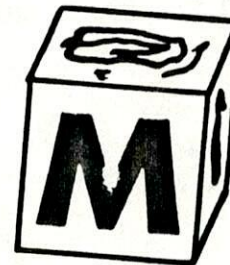


Storage in such a way
that they can't get to it.

The



of



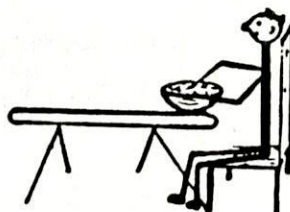
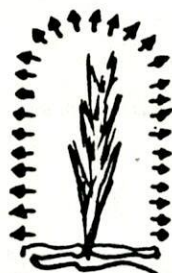
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distributed with full endorsement by

**PAN-ALASKA FISHERIES, INC.
DIVISION OF CASTLE & COOKE, INC.**

MAN'S TASTES DIFFER FROM THOSE OF HIS COMPETITORS, in that he wants his food to be clean and wholesome. He doesn't want *second choices* or *leftovers*.

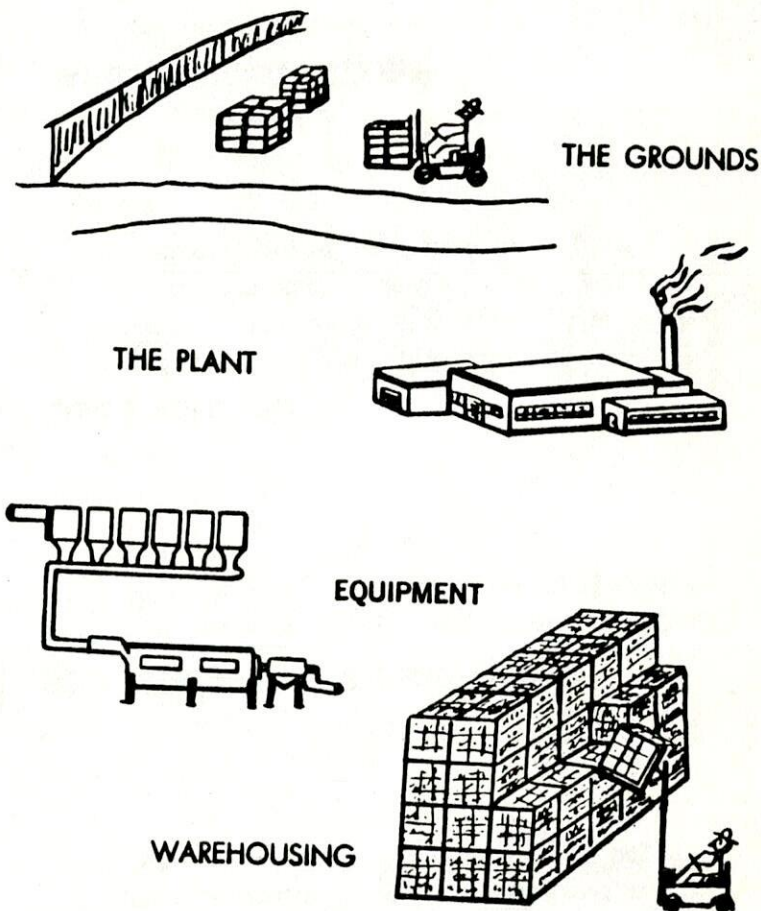
TO BE ASSURED OF CLEAN, WHOLESOME FOOD man must protect it all the way from seed to mouth.



Very often his *contenders* spoil more food than they actually eat. Man also, if he is not careful, can contribute to product contamination. Your job as a cannery worker is to help see that the product is protected in every way during the entire manufacturing process.

FOOD MANUFACTURING BEGINS WITH THE ARRIVAL OF THE RAW PRODUCT at the cannery and ends when the cased containers are delivered to a truck or railroad car.

MANUFACTURING INCLUDES THEN —



and involves operations all the way along the line.

THE PRACTICES USED BY MAN TO PROTECT FOOD are called manufacturing practices. If he wants to do a *good* job, he should follow **GOOD MANUFACTURING PRACTICES**.

GOOD MANUFACTURING PRACTICES INVOLVE

simple housekeeping rules plus a few ordinary precautions. In fact, we might say they are as simple as



SO — FOR SUCCESS AND SATISFIED CUSTOMERS

one merely needs to practice these ABC's of good manufacturing.



ALWAYS REMEMBER IT IS FOOD

you are packing for someone to eat.



BE CAREFUL, PROTECT THE PRODUCT

as you would your own food. Don't give the consumers the *leftovers* or *second choices*. Keep the competitors away. Keep out or kill insects, birds, rodents or other animals.



CLEAN UP REGULARLY AND THOROUGHLY.

Canning equipment should be of a type that can be cleaned and made of materials that won't end up in the product. *Remember equipment that can't be cleaned, won't be cleaned!*



DON'T EAT IN FOOD PREPARATION AREAS

where contamination of the product can occur. Use the places provided for this purpose.



EQUIPMENT NOT IN USE

may become a home for rodents and insects. Store it away so that this will not happen.



FOG OR STEAM IN A FOOD PLANT

will condense on cold equipment and pipes. Don't let it drip into the product or equipment.



GLASS WILL BREAK

and scatter. If this happens near or above the food, contamination may result. Use safety bulbs or protective devices under lighting fixtures and protect food from flying glass.



HANDS CARRY BACTERIA

and other contaminants. Wash them thoroughly with soap and water before handling food and most certainly after going to the rest room.





INSECTICIDES

and some other chemicals used in the plant are poisonous. Know what they are and store them in a locked cabinet away from food preparation areas.



JEWELRY THAT IS LOOSE

may end up in the product. Take it off or leave it at home. The same applies for flowers or other ornaments; don't wear them around the food.



KEEP UNNECESSARY ITEMS OUT

of the product preparation area. Personal belongings, including coats, sweaters, lunch boxes, etc., should be put somewhere else — preferably in a locker.



LIGHT IS IMPORTANT

It should be adequate if workers are to do their job properly. Replace burned out bulbs immediately.



MOLD GROWS QUICKLY

on most foods and on the warm moist surfaces of equipment in a food plant. Rapid handling of the product and frequent cleaning of the lines are the best ways to prevent it.



NONFOOD USES OF CANS OR JARS

can only lead to trouble and consumer complaints. Use them for food only.



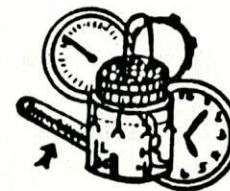
OPERATIONS OF CLOSING MACHINES,

if not proper, may lead to spoilage and serious product loss. Frequent checking is an absolute must.



PROCESSES USED FOR CANNED FOODS

have been carefully worked out after much detailed study. To shorten them is to invite trouble. Follow the times, temperatures and operating procedures outlined.



QUALITY PUT INTO FOOD BY NATURE

begins to decline the minute a product is harvested. But much can be done to preserve it through careful and quick handling.



REPAIR OF EQUIPMENT

is often necessary, and it is better to do it ahead of the season instead of while the plant is operating. When repairs are made, be sure they don't result in product contamination.



STORE INGREDIENTS

away from rodents, insects or other sources of contamination. Protective storage such as in a rodent-proof room is the usual precaution.



TOBACCO IN ANY FORM

must not be used around food. The same is true for gum, candy, and similar items.



USE OF GOOD QUALITY WATER

and ice is a must. When water is reused precautions should be taken to assure that it does not result in contamination of the finished product.



VERY IMPORTANT ARE THE CONTAINERS

Keep them clean before filling. Close and process promptly.



WASTE MATERIALS CAN CONTAMINATE

Don't allow them to accumulate in areas where food is being prepared.



XTRA PRECAUTIONS

of hats, properly fitting hair nets, and clean clothing always pay off when handling food. This gives the consumer an extra measure of protection.



YOU ARE A KEY FACTOR

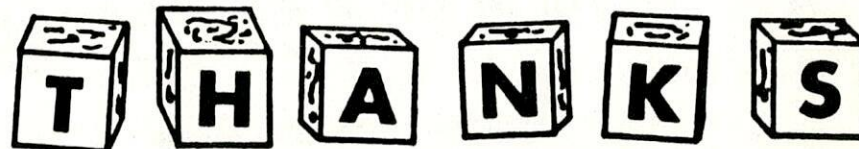
in these *GOOD MANUFACTURING PRACTICES*. Your company can't have them without you and your fellow employees.



"ZEE," IT'S NOT SO HARD,

and the *rewards are great* — satisfied consumers buying, time after time, the products you have prepared — thus assuring a continuation of your job.

Now, May We Say



for your past and continuing efforts in providing the consumers of America and the world with a clean, wholesome food supply.

12/77 King Crab, Snow Crab,
Dungeness Crab &
Frozen Salmon

Name _____
Date April, 1981
Issue Draft
SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 117 OF 127

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

XIX.

SUJIKO SALMON ROE PRODUCTS

A. ROE EXTRACTION

1. In a salmon canning operation the salmon head is removed by the indexing machine and then roe visera and gut are removed by inserting a finger into throat area and pulling out and away through head area.
2. In a Fresh-Frozen salmon operation, roe, viscera and gut are removed by inserting a finger into throat area from the body cavity and pulling out and away towards the tail.

B. WASHING - INSPECTION

1. Immediately after extraction, roe is separated from other gut contents and washed in sea water. Washed roe is inspected to remove any remaining viscera, dirt or parasites.

C. DRAINING

1. Washed roe is placed in perforated plastic baskets to drain 5 minutes before weighing.

D. WEIGHING

1. Roe is weighed after draining in a tared plastic basket. Each basket should contain 25 pounds fresh roe.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 118 OF 127

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

E. AGITATION

1. After weighing, roe is gently stirred in an agitation tank containing saturated brine solution with sodium nitrite additive.
2. Agitation Medium
 - a. Prepare 200 liters saturated saline solution using coarse grade salt (100% salinity as measured by salometer). Refer to Testing Procedure NO.16.
 - b. Dissolve 20 g sodium nitrite crystal in the above medium to obtain a 100 ppm sodium nitrite solution (66.7 ppm nitrite).
 - c. When using different quantities of saturated saline solution, prorate the amount of sodium nitrite crystal added to ensure that the resulting solution contains 100 ppm sodium nitrite.
 - d. 200 liters of the above medium will hold 125 pounds or five 25 pound baskets of salmon roe per agitation cycle.
 - e. Each time the medium is being reused the sodium nitrite content should be adjusted by adding 2 g.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

King Crab, Snow Crab,
Dungeness Crab,
& Frozen Salmon

Name _____

Date April, 1981Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 19 OF 127Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

sodium nitrite for each 200 liters of medium.

This is to replace the amount of sodium nitrite
absorbed into the roe during each agitation cycle.

- f. An agitation tank can be used for five agitation cycles
and then must be dumped and refilled with new medium.
- g. Methods to measure nitrite concentration are
described in Testing Procedure (TP NO. 16). Agitation
times and amount of sodium nitrate added between agitation
cycles can be adjusted slightly to achieve a level
of 10-12 ppm nitrite in roe on completion of agitation,
and to maintain a consistent level of sodium nitrite
in all media being used successively.

3. Agitation Time

- a. The required agitation time varies by fish species
and freshness of roe. The following agitation
times are used by Kuyokyo Company:

<u>Species</u>	<u>Firm Roe</u>	<u>Soft Roe</u>
Reds	17 minutes	20 minutes
Chums	23 minutes	30 minutes
Kings	23 minutes	30 minutes
Pinks	17 minutes	20 minutes
Silvers	17 minutes	20 minutes

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:
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CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 120 OF 127

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

Tayo Company uses a 25-26 minute agitation time for all species. Nichirei Company uses a 25-30 minute agitation time for all species.

F. DRAINING

After agitation the roe is placed in plastic baskets to drain for 5 - 10 minutes before transferring to the sorting table.

G. SORTING AND GRADING

1. Grading

- a. Each species of salmon roe is sorted and graded by size, color, firmness and wholeness of skein. Overall roe quality effects size grading standards. If overall roe quality is poor or roe is more mature, larger size and softer than usual, then size grades will be raised slightly. The size specifications referred to in the Grading Specifications are for firm good quality roe.

2. Unacceptable Quality Roe

- a. Roe skeins of unacceptable quality are weighed and discarded or packed as bait. Defective roe includes all roe unacceptable in the grading specifications

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab, &
Frozen SalmonCASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 121 OF 127Name _____
Date April, 1981
Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

such as: immature skeins; black skeins without head and tail; skeins that are both black and soft; soft skeins without head and tail; decomposed skeins; and excessively broken skeins.

3. Roe for Packing Top Layer

- a. During grading and sorting the best looking roe of each grade is put aside for packing the top layer of each box. Top roe must be whole, firm, have good color and have no cuts or black vein on at least one side of the skein.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab
Dungeness Crab &
Name Frozen SalmonDate DraftIssue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION
PAGE 122 OF 127Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

GRADING SPECIFICATIONS

SPECIES	GRADE	SIZE		COLOR	FIRMNESS	WHOLENESS OF SKEIN
		LENGTH	WIDTH			
Red	No. 1 - Large	≥ 7"	≥ 1"	bright, dark red	firm	uncut
	No. 2 - Medium	≥ 7"	< 1"	bright, dark red	firm	may have small cut
	No. 3 - Small	< 7"	< 1"	bright, dark red	firm	may have head or tail missing
	No. 4 - Cut	≥ 3"	≥ 1"	bright, dark red	firm	may have head or tail missing
	No. 4 - Black	< 7"	< 1"	black	firm	may have head or tail missing
	No. 4 - Soft	< 7"	≤ 1"	dark red	soft	may have head or tail missing
Chum	No. 1 - Large	> 7"	≥ 1.5"	bright red	firm	uncut
	No. 2 - Medium	≥ 7"	< 1.5"	bright red	firm	may have small cut
	No. 3 - Small	< 7"	≤ 1.5"	bright red	firm	may have head or tail missing
	No. 4 - Cut	≥ 3"	≤ 1.5"	bright red	firm	may have head or tail missing
	No. 4 - Black	< 7"	< 1.5"	black	firm	may have head or tail missing
	No. 5 - Soft	< 7"	≤ 1.5"	red	soft	may have head or tail missing
Pink	No. 1 - Large	≥ 7"	≥ 1"	bright orange	firm	uncut
	No. 2 - Medium	≥ 7"	< 1"	bright orange	firm	may have small cut
	No. 3 - Small	< 7"	< 1"	bright orange	firm	may have head or tail missing
	No. 4 - Cut	≥ 3"	≤ 1"	bright orange	firm	may have head or tail missing
	No. 4 - Black	< 7"	≤ 1"	black	firm	may have head or tail missing
	No. 4 - Soft	< 7"	≤ 1"	orange	soft	may have head or tail missing

REGULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,
Dungeness Crab &CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 23 OF 127

Name Frozen SalmonDate April, 1981Issue Draft

SUPERSEDES _____

 Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

GRADING SPECIFICATIONS FOR SWIKO SALMON ROE

SPECIES	GRADE	SIZE		COLOR	FIRMNESS	WHOLENESS OF SKEIN
		LENGTH	WIDTH			
Silver	No. 1 - Large	≥ 7"	≥ 1"	bright dark red	firm	uncut
	No. 2 - Medium	≥ 7"	< 1"	bright dark red	firm	may have small cut
	No. 3 - Small	< 7"	< 1"	bright dark red	firm	may have head or tail missing
	No. 4 - Cut	≥ 3"	< 1"	bright dark red	firm	may have head or tail missing
	No. 4 - Black	< 7"	< 1"	black	firm	may have head or tail missing
	No. 4 - Soft	< 7"	< 1"	dark red	soft	may have head or tail missing
King	No. 1 - Large	≥ 14"	≥ 3"	bright, very dark red	firm	uncut
	No. 2 - Medium	≥ 14"	> 3"	bright, very dark red	firm	may have small cut
	No. 3 - Small	< 14"	< 2"	bright, very dark red	firm	may have head or tail missing
	No. 4 - Cut	≥ 4"	≤ 3"	bright, very dark red	firm	may have head or tail missing
	No. 4 - Black	< 14"	≤ 3"	black	firm	may have head or tail missing
	No. 4 - Soft	< 14"	≤ 3"	very dark red	soft	may have head or tail missing

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77 King Crab, Snow Crab
Dungeness Crab &
Frozen Salmon

Name _____

Date April, 1981Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATION

PAGE 124 OF 127

Container type: _____
Size Container: _____
Weight Container: _____
Units/case: _____
Net Weight/case: _____
Gross Weight/case: _____
Container Code: _____

PROCESS PROCEDURE

H. PACKING AND SALTING1. Packaging Material

- a. After sorting and grading roe is packed into wooden boxes lined with two sheets of clear polyethylene. See Packaging Specifications.

2. Salting

- a. Before packing roe, the empty box and liner is sprinkled with fine kiln dried salt using a fine mesh screen, and each layer of roe is sprinkled with salt as it is packed. Total salt used per box is equivalent to about 5% of the roe weight. The amount of salt used will vary slightly with species and fish quality; with least salt required by Pinks, Reds, and Silvers; medium salting for Chums, and heavier salting for Kings. Firm roe of any species requires less salt than soft roe of any species.

3. Packing Arrangement

- a. Each grade of sujiko has a specific packing arrangement. Utmost care should be taken to assure that each box is packed uniformly and aesthetically, especially the top layer in the box. Specific packing arrangements for each grade are pictured in figures 1 to 7.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICE

King Crab, Snow Crab,
Dungeness Crab &CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATIONName Frozen SalmonPAGE 125 OF 127Date April, 1981Issue Draft

SUPERSEDES _____

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

I. WEIGHING

After the top layer is put on, each box is weighed and roe removed or added from under the top layer to make the correct packing weight.

To achieve a final cured weight of 22 pounds, the initial packing weight varies with species as follows:

<u>Species</u>	<u>Initial Packing Weight (Pounds)</u>
Reds	23.50
Silvers	23.50
Pinks	23.75
Chums	23.75
Kings	24.25

J. CURING

1. After weighing, the lids are placed over the boxes which are then turned upside down and palletized. The pallets are then weighted with cement weights and cured for five (5) days or longer at approximately 60-60°F.
2. During curing the nitrites are converted to nitrates. Nitrite concentration in finished sujiko must be below 5 ppm for import to Japan.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

12/77

King Crab, Snow Crab,

Dungeness Crab &

Name Frozen SalmonDate April, 1981Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS

MANUFACTURING SPECIFICATION

PAGE 26 OF 127

Container type:
 Size Container:
 Weight Container:
 Units/case:
 Net Weight/case:
 Gross Weight/case:
 Container Code:

PROCESS PROCEDURE

3. After 4-5 days curing time a test for nitrite concentration in finished product should be run on each species of sujiko by grade. Methods to measure nitrite concentration are described in Testing Procedure (TP NO.16). If all samples tested have below 5 ppm nitrite concentration, sujiko is ready for final inspection. If certain species or grades have nitrite concentrations above 5 ppm then curing time must be extended and further testing done on nitrite level before final inspection.

K. INSPECTION

1. During final inspection cured sujiko is checked for color, firmness, taste and odor, curing and final weight. Finished cured sujiko should be of natural bright color, without any black, yellow or other discoloration (excepting the No. 4, Black, grade). Cured sujiko should be firm in texture; any soft roe should be resalted and repacked to be reinspected at a later date. Cured sujiko is to be free of any unusual taste or odor due to deterioration in quality. Cured sujiko should have between 11-12% NaCl (see Testing Procedure NO.16). All cured sujiko must have nitrite concentration below 5 ppm, before final packaging and cold storage. See Finished Product Specifications.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES:

Name Frozen SalmonDate April, 1981Issue Draft

SUPERSEDES _____

CASTLE & COOKE FOODS
MANUFACTURING SPECIFICATIONPAGE 127 OF 127

Container type:
Size Container:
Weight Container:
Units/case:
Net Weight/case:
Gross Weight/case:
Container Code:

PROCESS PROCEDURE

2. For final weight check 10 percent of each days production is weighed to assure a maximum final weight of 22 pounds. Weights that are over or under should be adjusted by removing or adding cured roe.

L. PACKAGING

1. After final inspection the wooden lids are nailed on and the boxes are wire strapped and palletized.

M. COLD STORAGE

1. After final packing the finished sujiko is transferred to Cold Storage at 0°F to await shipment to Japan.

FORMULATOR:	TECHNICAL DIRECTOR:	CORPORATE ENGINEER:	PLANT MANAGER:	V.P. TECHNICAL SERVICES: